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EASTERN ARCHIPELAGO PART 111.

(SOUTH EASTERN PART)

FIRST EDITION 1911.

NOTICE TO MARINERS.

(To be inserted inside cover of all Sailing Directions.)

CAUTION WHEN APPROACHING BRITISH PORTS.

(1) My Lords Commissioners of the Admiralty, having taken into consideration the fact that circumstances may arise in which it may be necessary, on account of periodical exercises, manœuvres, or otherwise, to forbid all entrance to certain ports of the Empire, this is to give Notice that on approaching the shores of the United Kingdom, or any port of the British Empire, a sharp lookout should be kept for the signals described in the following paragraph, and for the vessels mentioned in paragraph (2), Part II., of this Notice, and the distinguishing and other signals made by them. In the event of such signals being displayed, the port should be approached with great caution, as it may be apprehended that obstructions may exist.

(2) **If entrance to a port is prohibited, three *red* vertical lights by night, or three *red* balls by day, will be exhibited in some conspicuous position, in or near to its approach, which signals will also be shown by the vessels indicated in paragraph (2), Part II., of this Notice.**

If these signals are displayed, vessels must either proceed to the position marked "Examination Anchorage" on the Admiralty Charts and anchor there, or keep the sea.

EXAMINATION SERVICE.

(1) Under certain circumstances, it may become necessary to take special measures to examine vessels desiring to enter the ports or localities at home or abroad, referred to in Notice to Mariners No. 1 of 1911, and re-published on 1st January in every succeeding year as long as required.

(2) In such case, vessels carrying the distinguishing flags or lights mentioned in paragraph (4) will be charged with the duty of examining ships which desire to enter the ports and of allotting positions in which they shall anchor.

(3) As the institution of the Examination Service at any port will never be publicly advertised, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (4), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun.

(4) By day the distinguishing flags of the Examination Steamer will be a special flag (white and red horizontal surrounded by a blue border) and a blue ensign.

Also, three red vertical balls if the port is closed.

By night the steamer will carry: (*a*) Three *red* vertical lights if the port is closed; (*b*) three *white* vertical lights if the port is open.

The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

(5) Masters are warned that, before attempting to enter any of these ports when the Examination Service is in force, they must in their own interests strictly obey all instructions as to entry given to them by the Examination Steamer. In the absence of any instructions from the Examination Steamer they must proceed to the position marked "Examination Anchorage" on the Admiralty Charts, and anchor there, or keep the sea.

(6) In case of fog, Masters of vessels are enjoined to use the utmost care, and the Examination Anchorage itself should be approached with caution.

(7) The pilots attached to the ports will be acquainted with the regulations to be followed.

(8535) Wt. 31614—228. 40,[redacted]

(*To face Cautionary Notice in all Sailing Directions.*)

NOTATIONS OF SUPPLEMENTS OR HYDROGRAPHIC NOTICES RELATING TO THIS BOOK.

To be filled in by Navigating Officer.

[In Chart Depôts the two first columns are alone to be filled up.]

Whether Supplement or Hyd. Notice.	Date of Publication and Number.	Whether pasted in or noted in Margins of Book, and Date of such Correction.

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NOTICE.

HYDROGRAPHIC DEPARTMENT, ADMIRALTY.

In January of each year the information affecting this book, which has been published during the preceding year in the Admiralty Notices to Mariners, is compiled and issued as a separate publication. If a Supplement has been issued during the year, this publication will only include Notices issued since the date of the Supplement. Mariners are advised to procure copies of these publications. They can be obtained gratuitously from the Admiralty Agent or Sub-Agents for the sale of charts on presentation of the coupons on the next page, either personally or by letter. In the latter case the cost of postage must be enclosed.

The Supplements to this book which may be published can also be obtained in a similar manner on presentation of the coupons below.

H. E. P.-C.

Revised Supplement II. to Eastern Archipelago Pilot, Part III. 1911.	Revised Supplement to Eastern Archipelago Pilot, Part III. 1911.	Supplement No. 1 to Eastern Archipelago Pilot, Part III. 1911.

(11041) Wt. 860/62 (16). 3,000.—9/11. T.G.E.

Summary of Notices to Mariners published during 1920, affecting

Eastern Archipelago Pilot, Part III.

1911.

Summary of Notices to Mariners published during 1919, affecting

Eastern Archipelago Pilot, Part III.

1911.

Summary of Notices to Mariners published during 1918, affecting

Eastern Archipelago Pilot, Part III.

1911.

Summary of Notices to Mariners published during 1917, affecting

Eastern Archipelago Pilot, Part III.

1911.

Summary of Notices to Mariners published during 1916, affecting

Eastern Archipelago Pilot, Part III.

1911.

CANCELLED.

Summary of Notices to Mariners published during 1915, affecting

Eastern Archipelago Pilot, Part III.

1911.

CANCELLED

Summary of Notices to Mariners published during 1914, affecting

Eastern Archipelago Pilot, Part III.

1911.

CANCELLED

Summary of Notices to Mariners published during 1913, affecting

Eastern Archipelago Pilot, Part III.

1911.

CANCELLED.

Summary of Notices to Mariners published during 1912, affecting

Eastern Archipelago Pilot, Part III

1911.

CANCELLED.

Summary of Notices to Mariners published during 1911, affecting

Eastern Archipelago Pilot, Part III.

1911.

CANCELLED.

EASTERN ARCHIPELAGO,

PART III.

(SOUTH-EASTERN PART)

COMPRISING

N.E. END OF CELÉBES, MOLUCCA AND
GILLOLO PASSAGES, BANDA AND
ARAFURA SEAS, AND NORTH, WEST,
AND SOUTH-WEST COASTS OF NEW
GUINEA.

FIRST EDITION.

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ADVERTISEMENT.

The Eastern Archipelago Pilot consists of three parts: Part I. comprises the Philippine islands (except the western coasts of Luzon and Paláwan), the Sulu archipelago, and the north-eastern coast of Borneo; Part II. describes the western, and the present work, Part III., the eastern portion of the Dutch islands of the Eastern archipelago.

The present work, together with the new Part I., were formerly included in Eastern Archipelago, Part I. (eastern part), which was compiled by Captain J. P. Maclear, R.N., in 1890, from various sources mentioned on the following page. A revised edition of Part I. was prepared by Captain J. Phillips, R.N., and published in 1902.

No connected survey has been made of the north and west coasts of New Guinea and off-lying islands; our knowledge of them is derived from many isolated expeditions touching at various points, and the longitudes of some of the principal points is open to great doubt. Additional information respecting these coasts is being continually gathered by the Dutch officers employed in these waters, much of which is incorporated in this work.

The present volume, prepared by Captain A. G. Douglas, R.N., contains all the available information received from the Netherlands Government and other sources, since 1902.

Views have been added to the volume, to supplement those on the charts, and it is anticipated that they will prove of service to the mariner.

Seamen are invited to transmit to the Secretary of the Admiralty notice of any errors or omissions they may discover, or additional information they may obtain, that it may be applied for the benefit of navigation.

By the publication of this work, Eastern Archipelago, Part I. (eastern part), second edition, 1902, Revised Supplement thereto, 1909, and all Notices to Mariners relating to them up to and including No. 1191, of 1911, as far as they relate to the region described in this volume, are cancelled.

H. E. P.-C.

Hydrographic Office,
Admiralty, London,
11th September, 1911.

(11041). Wt. 860/62 (16). 3,000—9/11. T G.E.

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Authorities consulted in the compilation of the original edition of this work:—

Cruise of the *Marchesa*.

Descriptive Dictionary of the Indian seas, by J. Crawfurd.

Horsburgh's Directory.

Instructions Nautiques sur le Grand Archipel d'Asie.

Logs of vessels in the possession of, and information supplied by, the Meteorological Office.

Malay Archipelago, by A. R. Wallace.

Moluksche Archipel.

Nautical and Mercantile Magazines.

Navigation of the Indian ocean, China and Australian seas, by Captain A. B. Becher. R.N.

Sailing Directions for the Indian archipelago and China, by A. G. Findlay.

Voyages through the Moluccan archipelago and to New Guinea, by Lieut. D. H. Kolff, of the Dutch Navy.

Authorities consulted in the preparation of the present volume, Part III.:—

Gregorij's Zeemansgids, Amsterdam, 1853 (referred to).

Lichtenlijst, Nederlandsch Oost-en West Indië.

Regeeringsalmanak voor Nederlandsch-Indië, 1911.

Statistiek van den Handel, &c., in Nederlandsch-Indië, Deel III., 1908, 1909.

Tijdschrift, Royal Dutch Geographical Society, May, 1911.

Wind and weather, currents, tides, and tidal streams, E.I. archipelago, 1897, by J. P. van der Stok, Ph.D.

Zeemansgids voor den Oost-Indischen Archipel, Deel IV., 1906, and Deel V., 1908, and supplements thereto of 1908, 1909, 1910, 1911.

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GLOSSARY

OF A FEW USEFUL GEOGRAPHICAL AND OTHER TERMS IN THE MALAY LANGUAGE.

Malay.	English.
Alang alang	Reeds
Angin	Wind
Api	Fire
Arang	Coal
Arus	Current
Ayer	Water
—— masin	Salt water
—— pasang	Flood or high tide
—— surut	Ebb or low tide
—— tawar	Fresh water
Baharu	New
Bambu	Bamboo cane
Barat	West
Batu	Rock, stone
Batu Arung	Coal
Besar	Large, great
Besi	Iron
Beting	Shoal, sand
Buloh	Bamboo cane
Burung	Bird
Buwah	Fruit
Chettek	Shallow
Daging-Sapi	Beef
Dalem or Dalam	Deep
Dammar	Gum
Darat	Coast, land
Dessa	District, with villages
Djemara boom	Casuarina tree
Ef (Misol)	Island
Gunong	Mountain
Gusong	Reef of rocks
Ikan	Fish
Itam	Black
Jalan	Road
Jambatan	Mole, jetty
Jankar	Anchor
Kalapa or Kelapa	Cocoanut
Kaler	North
Kali	River
Kampong	Village
Kapal	Ship
Karang	Coral
Kawala	Mouth of a river
Kayu	Tree
Kechil	Little, small
Kering	Dry
Kidul	South
Kotta	Town
Kring	Dry
Kroon boom	Round-topped tree
Kulon	West
Kupel boom	Dome-topped tree
Labuan	Anchorage
Lama	Old
Laut	Sea
Layar	Sail
Lor	North
Lumpar or Lumpur	Mud

Malay.	English.
Manuk	Bird
Masin	Salt
Mesigit	Mosque
Mios (New Guinea)	Island
Mis (New Guinea)	Island
Missigit	Mosque
Muara	Mouth of a river
Napo, or Napo napo (on N.C. Celébes)	Reef
Negri	Town
Nipa	Small marsh palm
Nusa	Island
Padi	Rice in the straw
Pandoman	Mariner's compass
Panjang	Long
Pantei	Coast, seaboard
Pasang besar	High tide
——— kring	Low tide
——— naik	Flood tide
——— surut	Ebb tide
——— turun	Ebb tide
Pasir	Sand
Pelabuan	Anchorage
Pingir Laut	Coast, seaboard
Pisang	Banana
Pohun or Puhun	Tree
Prau, prahu	Boat, ship
Pulo	Island
Putih	White
Renda	Low
Rotan	Rattan cane
Roti	Bread
Ruma	House
Salatan	South
Sampan	Small boat
Sawuh	Anchor
Sayuran	Vegetables
Selat	Channel, strait
Si	An article inseparably united to nouns and denoting familiarity
Sungi	River
Tali	Cable
Tanah	Land
Tanjong	Cape, point
Tebu	Sugar cane
Tedoh	Calm
Telok or Teluk	Bay
Tepilaut	Coast, seaboard
Tida Angin	Calm
Timur	East
Titian	Mole, jetty
Tohor	Shallow
Toko	Store
Trepang	Béche-de-mer
Trumbu	Dangerous hidden shoal
Trusan	Channel
Tuwak	Old
Ujong (Jav.)	Cape, point
Utara	North
Wai (Buru)	River
Wetan	East

SYSTEM OF ORTHOGRAPHY

Adopted by the Admiralty for Sailing Directions and Charts.

As far as has been found possible with existing knowledge, native names are spelt in accordance with the following system, which has been adopted by the principal authorities in Great Britain, and by the United States, and has been for some years in process of gradual introduction into all Admiralty Sailing Directions and Charts.

No change is made in the orthography of foreign names in countries which use Roman Letters ; thus French, Spanish, Portuguese, Dutch, &c., names will be spelt as by the respective nations.

1. Where native names have been so long written in a form which, though not in accordance with this system, has become familiar to English eyes from being so spelt in all charts and maps, they are retained.

2. The true sound of the word as locally pronounced is taken as the basis of the spelling.

3. An approximation of the sound is alone aimed at. A system which would attempt to represent the more delicate inflections of sound and accent would be so complicated as only to defeat itself.

4. The broad features of the system adopted are that vowels are pronounced as in Italian and consonants as in English, *every letter being pronounced.* Two accents only are used :—

(1.) The acute, to denote the syllable on which stress is laid. The use of this is very important, as the sounds of many names are entirely altered by the misplacement of this " stress."

(2.) The sign ˘ over the letter U to denote the short sound of that vowel under certain circumstances. (See table.)

5. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai*, *au*, *ei*.

The amplification of the rules is given below.

Information is invited as to the proper spelling of native names, so as to produce the nearest approximation to the true sound, by this system.

Letters.	Pronunciation and Remarks.	Examples.
a	*ah*, *a* as in *father* - - - - -	Java, Banána, Somáli, Bari.
e	*eh*, *e* as in *bet ;* *a* as in *fate* - - -	Tel-el-Kebír, Oléleh, Yezo, Levúka, Peru.
i	English *e ;* *i* as in *ravine ;* the sound of *ee* in *beet.* Thus, not *Feejee*, but	Fiji, Hindi.
o	*o* as in *mote* - - - - - - -	Tokyo.
u	long *u* as in *flute ;* the sound of *oo* in *boot.* *oo* or *ou* should never be employed for this sound. Thus, not *Zooloo* or *Zoulou*, but	Zulu, Sumatra.

Letters.	Pronunciation and Remarks.	Examples.
	The shorter sound of the different vowels, when necessary to be indicated, can be expressed by doubling the consonant that follows. The sounds referred to are as follows :— The short *a* as in *fatter*, as compared with the long *a* as in *father*. The short *e* as in *better*, as compared with the long *e* as in *me*. The short *i* as in *sinner*, as compared with the long *i* as in *wine*. The short *o* as in *sobbing*, as compared with the long *o* as in *sober*. The short *u* as in *rubber*, as compared with the long *u* as in *rubric*.	Yarra, Tanna, Mecca, Jidda, Bonny.*
ŭ	is the same short sound of *u* as is denoted by doubling the consonant following, but is used, and only used, where such doubling is impossible, as in case of words where *u* is followed by two different consonants, as in *Tŭng*, pronounced as the English *tongue*.	
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulúa, Oosima.
ai	English *i* as in *ice* - - - -	Shanghai.
au	*ow* as in *how* - - thus, not *Foochow*, but	Fuchau.
ao	is slightly different from *au* - - -	Macao.
aw	when followed by a consonant or at the end of a word as in *law* - - - thus	Cawnpore.
ei	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from *ey* in the English *they*, or *ei* in *eight*.	Beirút, Beilul.
b	English *b*.	
c	is always soft, but is so nearly the sound of *s* that it should be seldom used. If *Celébes* were not already recognised it would be written *Selébes*.	Celébes.
ch	is always soft as in *church* - - -	Chingchin.
d	English *d*.	
f	English *f*. *Ph* should not be used for the sound of *f*. Thus, not *Haiphong*, but	Haifong, Nafa.
g	is always hard. (Soft *g* is given by *j*) -	Galápagos.
h	is always pronounced when used.	
hw	as in *what*, better rendered by *hw* than *wh*, or *h* followed by a vowel. Thus, *Hwang ho*, not *Whang ho* or *Hoang ho*.	Hwang ho, Ngan hwei.
j	English *j*. *Dj* should never be put for this sound.	Japan, Jinchuen.

---

* The *y* is retained as a terminal in this word under Rule 1. The word is given as a familiar example of the alteration in sound caused by the second consonant.

Letters.	Pronunciation and Remarks.	Examples.
k	English *k*. It should always be put for the hard *c*. Thus, not *Corea*, but	Korea.
kh	The Oriental guttural	Khan.
gh	is another guttural, as in the Turkish	Dagh, Ghazi.
l	As in English.	
m		
n		
ng	has two separate sounds, the one hard as in the English word *finger*, the other as in *singer*. As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in *loophole*	Mokpho, Chemulpho.
th	stands both for its sound in *thing*, and as in *this*. The former is most common	Bethlehem.
q	should never be employed; the sound of *qu* in *quiver* is given as *kw*. When *qu* has the sound of *k*, as in *quoit*, it should be given by *k*.	Kwangtung.
r	As in English.	
s	As in *sin*.	
sh	As in English.	
t		
v		
w		
x		
y	is always a consonant, as in *yard*, and therefore should never be used as a terminal, *i* or *e* being substituted.	Kikuyu.
	Thus, not *Mikindány* or *Wady*, but	Mikindáni, Wadi.
	not *Kwaly*, but	Kwale.
z	English *z*	Zulu.
zh	French *j*, or as *s* in *treasure*	Muzhdaha.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress which affects the sound of the word, it should be marked by an *acute* accent.	Tongatábu, Galápagos, Paláwan, Saráwak.

In the case of native names in countries under the dominion of other European powers, in whose maps, charts, &c., the spelling is given according to the system adopted by that power, such orthography is, as a rule, disregarded, and the names are spelt according to the British system. Thus the island east of Java in possession of the Dutch is spelt Madoera by them, but on Admiralty charts Madura. A town in Java appears on Dutch charts as Tjilatjap; in the British, Chilachap.

The phonetic value of vowels in Oriental languages is given below, but the accents have been omitted to be used in this work.

a............as the............*u*............in *but*.
ā............ ,, ...*a*............in *father*.
e............ ,, ...*ai* ....in *fail*.
i............ ,, ...*i*............in *hit*.
ī............ ,, ...*ee* ....in *cheese*.
o............ ,, ...*o*............in *bold*.
u............ ,, ...*oo* ....in *wood*.
ū............ ,, ...*oo* ....in *fool*.
ai .... ,, ...*ai* ....in *aisle*.
au .... ,, ...*ou* ....in *loud*.

In other combinations of vowels they should be pronounced separately on the above principles.

When a foreign language is written in a vocabulary of fixed sounds, so as to permit of transliteration into the British system, a table of equivalents for each letter is drawn up, and names of places can be transliterated without regard to pronunciation.

To reduce Greek names to the orthographic form, required by the foregoing system, would require so many changes that it has been decided to defer the revision of Admiralty publications until the system has been more generally introduced and used.

The Greek names are therefore left for the present in their old shape, but these give in most cases a very erroneous idea of the sound of the names, as pronounced by Greeks, and in many cases the modern Greek spelling gives a clue to the pronunciation by aid of the table of equivalents.

Thus Ευβοια now spelt Eubœa is pronounced Evvia.
,, Χαλκις ,, Chalcis ,, Khalkis.
,, Κεφαλληνια ,, Cephallonia ,, Kefallinia.

Whenever C appears in a Greek name as at present written it may be taken for granted it has the sound of K.

Greek Letters	Roman Equivalents by Admiralty System	Greek Letters	Roman Equivalents by Admiralty System
Α α	a	Ρ ρ	r
Β β	v	Σ σ ς	s
Γ γ	g	Τ τ	t
Δ δ	d	Υ υ	i
Ε ε	e	Φ φ	ph
Ζ ζ	z	Χ χ	kh
Η η	i	Ψ ψ	ps
Θ θ	th	Ω ω	o
Ι ι	i	ΑΙ αι	ei
Κ κ	k	ΕΙ ει	i
Λ λ	l	ΟΙ οι	i
Μ μ	m	ΟΥ ου	u
Ν ν	n	ΥΙ υι	i
Ξ ξ	x	ΑΥ αυ	aph, av
Ο ο	o	ΕΥ ευ	eph, ev
Π π	p	ΗΥ ηυ	iph, iv

INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND THE GENERAL NAVIGATION OF H.M. SHIPS.

ON THE CORRECTION OF CHARTS, SAILING DIRECTIONS, AND LIGHT LISTS.

THE three descriptions of publications as guides to navigation, which are affected by the continual changes and alterations that take place, are the Charts, the Sailing Directions, and the Light Lists.

Of these the Charts should always be, so far as our knowledge permits, absolutely correct to date; the Sailing Directions, however, cannot, from their nature, be so corrected, and *in all cases where they differ from charts, the largest scale chart must be taken as the guide for navigation.*

The Light Lists are corrected annually.

1. *Charts.*—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Department they are correct to the date of issue as stamped on each folio. They then receive such corrections by hand in the depôts as are required, and are so issued to the ships.

The charts in the folios should have the same number and title as shown against each in the Lists pasted on the outside of the folio. The Navigating Officer is to satisfy himself that they do so agree before signing the receipt for the charts, &c.

All small but important corrections affecting navigation that can be made by hand are notified by Notices to Mariners, and should at once be placed on the charts to which they refer, in accordance with the following uniform system:—

1. All corrections, additions to, or erasures on charts are to be neatly made in *red* (except as explained later in paragraph 6). In every case the recognised chart abbreviations are to be used.

2. The number and date of every Notice to Mariners, from which corrections, &c., as above have been made, are to be entered at the lower left-hand corner of the chart, in *red*, in the following manner, viz.:—

07 . *123*, *1145*, *1503;* 08 . *232;* 10 . *1506*, *1721;* 11 . *34*, &c.

3. The *amount* of the substance of a Notice to Mariners inserted on the chart should as a general rule be limited to what is likely to be engraved on the chart plate when corrected in office, and it should also be inserted as far as possible in a similar style; thus:—

(*a*) the amount of information to be inserted depends on the scale of the chart, and should be in accordance with that already engraved on the chart. On the largest scales will generally be found all the principal details of lights and their sectors, buoys, &c. On the smallest scales buoys are seldom inserted, and lights are only briefly described as Lt. F., Lt. Gp. Fl., Red, &c., &c., without any details, as to height, visibility, periods, &c.;

(*b*) when inserting corrections, care must be taken not to obliterate any of the other information already on the chart;

(*c*) wrecks are shown thus, / / / "Wreck," and on large scales the "year" is added;

(*d*) when "Notes" are to be inserted (such as Cautionary, Tidal, &c.) they should be written in a convenient but conspicuous place, where they will not interfere with any other details.

4. The numbers and dates of Notices should *not* be entered on the Charts, except as required by paragraph 2, as they only tend to the increase of illegibility.

5. Erasures, when necessary, should consist of a single line made with a pen. A knife or ink eraser should not be used.

6. Temporary or intended changes should be inserted on the chart in pencil, and in the latter case finally inked in, in red, when further notice has been received confirming the previous one.

7. One copy of each Notice to Mariners should be pasted into the Sailing Directions in its appropriate place, so that, if fuller detail is required than what the scale of the chart permits to be given, it may be found on the proper page referring to the given locality or subject.

When these corrections are so large that they cannot be conveniently thus made they are put upon the plates, and fresh copies are issued to the ships to replace the others, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which these large corrections are made are noted on the chart plates under the heading of "New Editions" in the middle of the lower edge; those of the smaller corrections at the left-hand lower corners as "Small Corrections."

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (which will be found in the lower right-hand corner), in order that at the Admiralty it may be known what edition of the chart is referred to, and to what date the chart has been corrected.

It should be remembered that in addition to the large and small corrections here mentioned, the chart plates are being constantly corrected for numerous details not considered to be of such a nature as to affect safe navigation. For these corrections the charts are not necessarily dated, nor are any Notices to Mariners issued, and it follows therefore that two charts, both bearing the same dates of "New Editions" and "Small Corrections," may not exactly agree in all respects.

2. *The Sailing Directions* are not corrected before issue, but on page iii. in the "Advertisement" to each volume will be found the number of the last Notice to Mariners used in its revision, the numbers of the subsequent Notices affecting it between going to press and issue to H.M. Ships are given in the Notice to Mariners announcing its publication.

Supplements and Revised Supplements referring to each volume are published from time to time. Supplements contain all the information received up to date since the publication of the volume to which they refer, and a Revised Supplement cancels the previous Supplements.

The existence of a Supplement is to be noted in the tabular form placed for the purpose inside the cover of each volume, and also on receipt of a further Revised Supplement after commission. Two copies are issued to each ship, one of which is to be retained intact, for reference, notations referring to it being made on the pages of the Sailing Directions affected: the other copy may be cut up, if considered desirable, the slips being pasted in the volume at the appropriate place.

In the advertisement to each Supplement will be found the number of the last Notice to Mariners used in its compilation.

In January of each year, a summary of the information affecting each volume of Sailing Directions, which has been published during the preceding year in Notices to Mariners, is issued in a separate publication. If a Supplement or Revised Supplement has been issued during the year, this summary will only include Notices to Mariners issued since the date of such Supplement; if one is in preparation at the end of the year, no summary will be issued. These summaries are only issued to H.M. Ships with the books to which they refer.

An early duty of the Navigating Officer after drawing a chart set is to correct the Sailing Directions from the Supplements or Revised Supplements, Annual Summaries of Notices to Mariners and Notices to Mariners supplied with the chart set.

As Notices to Mariners prior to the date of issue of a chart set from the Hydrographic Department are not supplied with the set, he should demand from that Department such Notices to Mariners as are required to complete the interval between the last published Supplement, Revised Supplement, or Summary of Notices to Mariners, and the first number of the Notices to Mariners drawn with the chart set.

One copy of each Notice to Mariners should be pasted into the Sailing Directions in its appropriate place as soon as received.

It must, however, be thoroughly understood that Sailing Directions will never be correct in all minor details, except up to the date of the last Supplement or Revised Supplement, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide; for which purpose, for ordinary navigation, they are sufficient.

3. *The Light Lists*, annually published at the beginning of each year, are not corrected in the depôts before issue, but appendices are issued every week with the weekly copies of Notices to Mariners, giving the alterations that have taken place.

It is the duty of the navigating officer when he receives the set of charts to make notations in the Light Lists from these appendices, and from Notices to Mariners of later date; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions does not embrace the sectors, and the other information on the lights may be obsolete, in consequences of changes made since publication. A red label to this effect is inserted opposite page 1 of all Sailing Directions. The charts also may not be equally up-to-date in some details, for which no Notices to Mariners have been issued.

THE USE OF CHARTS AS NAVIGATIONAL AIDS AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

1. *Reliance on a Chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the survey was made. The scale for publication is now generally that of the original survey, except in the case of Coast sheets, which are sometimes reduced. It should not, therefore, be assumed that the original survey was made on a larger scale than that published.

It must be borne in mind that the only method of ascertaining the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat or vessel obtaining the soundings is kept on given lines; that each time the lead descends it only ascertains the depth of water over an area equal to the diameter of the lead, that is about two inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a width of two inches.

Surveys are not made on uniform scales, but each survey is made on a scale commensurate with its apparent importance. For instances, a general survey of a coast which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, while surveys of areas where vessels are likely to anchor, are made on a scale of three inches to the mile, and surveys of frequented ports, or harbours likely to be used by Fleets, on a scale of from six inches to ten inches to the nautical mile.

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large scale Coast surveys.

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, *i.e.*, of 100 feet square.

The following diagram represents as many soundings as can be placed legibly on a square inch of paper: —

16	15	15	13	13	14	12	11	10	9
14	15	14	14	13	13	12	11	9	8
15	15	14	17	16	14	13	10	10	9
16	16	17	18	16	12	11	8½	9	10
18	17	15	12	9	7½	7½	7½	9	10
19	16	12	9	5½	4½	5½	6½	8½	9
22	19	16	10	5½	5½	6½	7½	8½	10
20	16	12	7½	5½	6½	6½	7½	8½	10
16	15	11	9	7½	7	7½	8½	10	11
20	17	14	11	12	10	9	10	11	13

Little assistance in detecting excrescences on the bottom is afforded by the eye, when sounding in a boat, even in clear weather, on account of the observer being within five feet of the surface; none in turbid seas. If, therefore, there is no inequality in the soundings to cause suspicion, a shoal patch between two lines may occasionally escape detection.

Lines of soundings plotted as close as may be practicable on a scale of 6 inches to the mile would be 100 feet apart, and each line would be only 2 inches in actual width.

Thus, in a chart on a scale of 1 inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape the lead; whilst in a chart on a scale of 6 inches, inequalities as large as battle-ships, if lying parallel to, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom.

General Coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the contour line of 10 fathoms, without taking every precaution to avoid a possible danger; and even with surveys of harbours on a scale of 6 inches to the mile, vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead will not rest on them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch, **and this rule should be invariably followed, viz., that instead of considering a coast to be clear, unless it is shown to be foul, the contrary should be assumed.**

2. *Fathom Lines a Caution.*—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, as before mentioned, another warning, especially for ships of heavy draught.

Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed round, as there is no knowing how closely the spot may have been examined.

3. *Chart on largest scale always to be used.*—It sometimes happens that, from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or soundings. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

4. *Caution in using Small Scale Charts.*—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

5. *Graduation.*—All Plans are now being graduated in skeleton style before publication in order to facilitate easy reference to Astronomical positions; previously published plans are also graduated as opportunity offers. The graduation is, however, of necessity, often based upon imperfect information of a conflicting nature; for this reason, whenever an Astronomical position is quoted other than approximate (*i.e.*, when seconds are given), it is necessary to quote also the number of the particular chart from which the position has been derived.

6. *Distortion of Printed Charts.*—The paper on which charts are printed has to be damped. On drying, distortion takes place from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree, when carefully plotted upon the chart, especially if the lines are to objects at some distance. The larger the chart the greater the amount of this distortion.

7. *Buoys.*—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should therefore be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings or angles of fixed objects on shore and not by buoys.

Gas Buoys.—The lights shown by gas buoys cannot be implicitly relied on, as, if occulting or flashing, the apparatus may get out of order, or the light may be altogether extinguished. These lights in the British islands are from 5 to 217 candle power.

8. *Lights.*—Circles drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely indicate, in the case of lights which do not show the same characteristics or colours in all directions, the bearings between which the differences occur.

All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to height, at the end of each Light List affords a means of ascertaining how much more or less the light is visible should the height of the bridge be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, or candle power, as given in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles, if of any power. (*See* table in Light List before mentioned.)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the vessel is in the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

9. *Fog Signals.*—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the fog signal station, in some instances even when in close proximity to it. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a station until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be made. When sound has to travel against the wind, it may be thrown upwards: in such a case, a man aloft might hear it when it is inaudible on deck. Under certain conditions of the atmosphere, when a fog signal is a combination of high and low notes, one of the notes may be inaudible.

The mariner should not assume—

a. That, because he fails to hear the sound, he is out of hearing distance.

b. That, because he hears a fog signal faintly, he is at a great distance from it.

c. That, because he hears the sound plainly, he is near it.

d. That, because he does not hear it, even when in close proximity, the fog signal has ceased sounding.

e. That the distance from and the intensity of the sound on any one occasion, are a guide to him for any future occasion.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

10. *Tides and Tidal Streams.*—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be remembered that there are indraughts to all bays and bights, although the general run of the stream may be parallel to the shore.

The turn of the tidal stream off-shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by about three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, "Table B, for finding the height of tide at any intermediate hour between high and low water," and diagrams, given in the Tide Tables, will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the level of low-water ordinary springs. This always occurs on the coasts of Europe at the equinoxes, but in other parts of the world and especially in the tropics, such periodic low tides may coincide more frequently with the solstices. Wind or a high barometer may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

11. *Arrows* on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

12. *Fixing position.*—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are supplied with a station-pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment: First, that the objects be well chosen; and, second, that the observer is skilful and rapid in his use of the sextant and station-pointer.

For the former, reference can be made to the pamphlet on the use of the station-pointer, which is in every chart box; the latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or gun-fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart of fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then; firstly, to check the general accuracy of the chart, as above stated; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow and on the beam, the distance from the object at the latter position being the distance run between the times of taking the two bearings, allowing for current, gives an excellent fix for a departure but does not ensure safety, as the point and probably the rocks off it are abeam beforo the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed; the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current.

This is, however, only strictly true if the current is directly with or against the course of the ship. If a cross current has to be allowed for, the results by this method may be altogether erroneous and misleading. The following example shows in a tabular form the errors that might be produced by accepting the distance run in the interval, allowing for current, as the distance of the object at time of second bearing.

Example: A vessel steering East sights a light bearing E.N.E., or two points on the bow; one hour after, having run in the interval 10 miles by log, the light bears N.E., *i.e.*, she has doubled the angle on the bow. Current, in all cases, at the rate of 2 miles an hour.

Direction of Current	Distance run between 1st & 2nd Bearings		Distance of Light at 2nd Bearing	Direction of Current	Distance run between 1st & 2nd Bearings		Distance of Light at 2nd Bearing
	By Log	Allowing for Current			By Log	Allowing for Current	
	Miles	Miles	Miles		Miles	Miles	Milos
East -	10	12	12	West	10	8	8
E.N.E.	10	11·8	10	W.S.W.	10	8·2	10·2
N.E. -	10	11·4	8	S W.	10	8·7	11·9
N.N.E.	10	11	6·2	S.S.W.	10	9·4	13·6
North	10	10·2	5·3	South	10	10·2	14·7
N.N.W.	10	9·4	4·9	S.S.E.	10	11	15
N.W.	10	8·7	5·3	S.E.	10	11·4	14·7
W.N.W.	10	8·2	6·1	E.S.E.	10	11·8	13·8

The following rule should be observed in all cases of a cross current, viz.: —

When the angle between the second bearing and the course made good (over the ground) is double the angle between the first bearing and the course made good (over the ground) the distance from the object is equal to the distance made good (over the ground) between the times of the first and second bearings.

To get a reliable result the difference between the first bearing and the course made good (over the ground) should never be less than 20°. It follows, therefore, that it is necessary, before observing the first bearing, to decide upon the course being made good (over the ground). This may be done as follows, viz.: —

From any point, A, on the chart draw a line A B, representing by its direction the course steered and by its length the speed through the water. From the point B, draw another line, B C, representing in a similar manner the estimated direction and rate of the current, &c., to be allowed for. Then a line joining the points A and C will represent in the same manner the course and speed which are being made good (over the ground).

A table of factors, by which to multiply the distance run, to obtain the distance of the object when any number of degrees between the two bearings has been observed, is supplied with all chart sets.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, *i.e.*, should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed; errors may be made in applying the deviation; or errors may creep in in laying them on to the chart. For these reasons, a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude or longitude) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. A deep cast of the lead at the same time may often serve to give an approximate position on the line. An early and very accurate position can also be obtained by Sumner's method, by getting a Sumner line by a bright star at daylight when the horizon is well visible, and another Sumner line by the sun when a few degrees above the horizon, or, better still, by observing two or more stars at twilight. The Sumner lines thus obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

13. *Change of Variation of the Compass.*—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles, and in the English Channel about 5° in 400 miles. The Variation Chart should be consulted on this head.

On certain general charts embracing large areas with considerable change of variation, true compasses are placed instead of magnetic compasses, the variation being shown by *isogonic lines* (curves of equal magnetic variation), in a similar manner to the Variation Chart. One or two *isogonic lines* are also sometimes placed on charts, in addition to the magnetic compasses, in order to indicate the general direction of these curves, and thus facilitate the determination of the variation to be employed in portions of the chart not in immediate proximity to any one of the engraved compasses.

14. *Local Magnetic Disturbance of the Compass on board Ship.*— The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places on the globe.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

15. *Use of Oil for Modifying the Effect of Breaking Waves.*— Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows: —

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing

else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

At anchor, when the sea is sufficient to render it difficult to hoist up or in boats, oil bags from forward or from the swinging booms have been found to render the sea alongside comparatively smooth.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be: hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

12. Towing a vessel in a heavy sea, oil is of the greatest service, and may prevent parting the hawser. Distribute from the towing vessel forward and on both sides: if used only aft the tow alone gets the benefit.

16. *Concise Rules for Revolving Storms*:—

1. Revolving storms are so named because the wind in these storms revolves round an area of low pressure situated in the centre. They have also local names, and are termed hurricanes in the West Indies and South Pacific Ocean: cyclones in the Indian Ocean, Bay of Bengal, and Arabian Sea; and typhoons in the China Sea.

2. In these storms the wind always revolves the same way in the same part of the world, that is, against the movement of the hands of a watch in the northern hemisphere, and with the hands of a watch in the southern hemisphere. The wind does not revolve in circles, but has a spiral movement, inwards, towards the centre.

3. Revolving storms have also, as a general rule, a progressive movement. Within the tropics they usually move from east to west at first, and then curve towards the pole of the hemisphere in which the storm is generated, and afterwards move from west to east.

4. The track which the centre of the storm takes is called the path of the storm, and the portion of the storm-field on the right of the path is known as the right-hand semicircle, and that on the left as the left-hand semicircle of the storm.

5. In the right-hand semicircle, if the observer be stationary, the wind will always shift to the right, and in the left-hand semicircle to the left. This law holds good in both hemispheres.

6. If a vessel be so situated in a storm that running before the wind the path of the advancing storm will be crossed, this is considered to be the dangerous semicircle. This will always be the right-hand semicircle in the northern hemisphere, and the left-hand in the southern.

7. These storms are most frequent in the northern hemisphere from July to November, and in the southern hemisphere from December to May. In the Bay of Bengal and Arabian Sea they, however, occur most frequently about the time of the change of the monsoon.

8. The area over which revolving storms have been known to extend varies in diameter from 20 miles to some hundreds of miles, and their rate of movement in the West Indies averages about 300 miles a day; in the China Sea, Bay of Bengal, and Arabian Sea about 200 miles a day; and in the Indian Ocean from 0 to 200 miles a day, the more stationary storms occurring at the beginning and end of the hurricane season.

9. The indications of the approach of a revolving storm are (1) an unsteady barometer, or even a cessation in the diurnal range, which is constant in settled weather; (2) a heavy swell not caused by the wind then blowing; (3) an ugly, threatening appearance of the sky.

10. In order to judge what is the best way to act if there is reason to believe a storm is approaching, the seaman requires to know (*a*) in which direction the centre of the storm is situated, (*b*) in which semicircle the ship is situated.

11. As these points cannot be determined if a vessel is moving with any speed through the water, the first proceeding should be to "stop" or "heave to," and, as it is always best to assume, at first, that the vessel may be in the dangerous semicircle, she should be hove to on the starboard tack in the northern hemisphere, and on the port tack in the southern.

12. If an observer faces the wind the centre of the storm will be from 12 to 8 points on his right hand in the northern hemisphere, and on his left hand in the southern hemisphere; 12 points when the storm begins; about 10 points when the barometer has fallen three-tenths of an inch, and about 8 points when it has fallen six-tenths of an inch or upwards.

13. If the wind shifts to the right the vessel is in the right-hand semicircle, if to the left in the left-hand semicircle, and, if the wind

is steady in direction, but increasing in force, she is in the direct path of the storm.

14. If the seaman has reason to think that his vessel is in the direct path of the storm he should run with the wind on the starboard quarter in the northern, and on the port quarter in the southern, hemisphere until the barometer has ceased falling. If she is in the right-hand semicircle in the northern hemisphere she should remain hove to on the starboard tack, but if in the southern hemisphere run with the wind on the port quarter; if she is in the left-hand semicircle in the northern hemisphere she should run with the wind on the starboard quarter, but if in the southern hemisphere remain hove to on the port tack.

15. Should a vessel not have sufficient room to run when in the least dangerous semicircle, she should heave to on the port tack in the northern, and on the starboard tack in the southern, hemisphere.

16. If in a harbour or at anchor the seaman should be just as careful in watching the shifting of the wind and ascertaining the direction of the centre, as by so doing he will be able to tell on which side of the path of the storm he is situated, and be able to act according to circumstances.

17. Should the centre of a storm pass over a vessel, the wind, after blowing furiously in one direction, ceases for a time, and then blows with equal fury from the opposite direction. This makes a confused pyramidal sea, which is especially dangerous.

IN THIS WORK THE BEARINGS ARE ALL MAGNETIC, EXCEPT WHERE MARKED AS TRUE.

THE LATITUDES AND LONGITUDES GIVEN IN THE TEXT ARE APPROXIMATE.

THE VARIATION GIVEN IN THE SEVERAL PAGES IS FOR THE YEAR 1911.

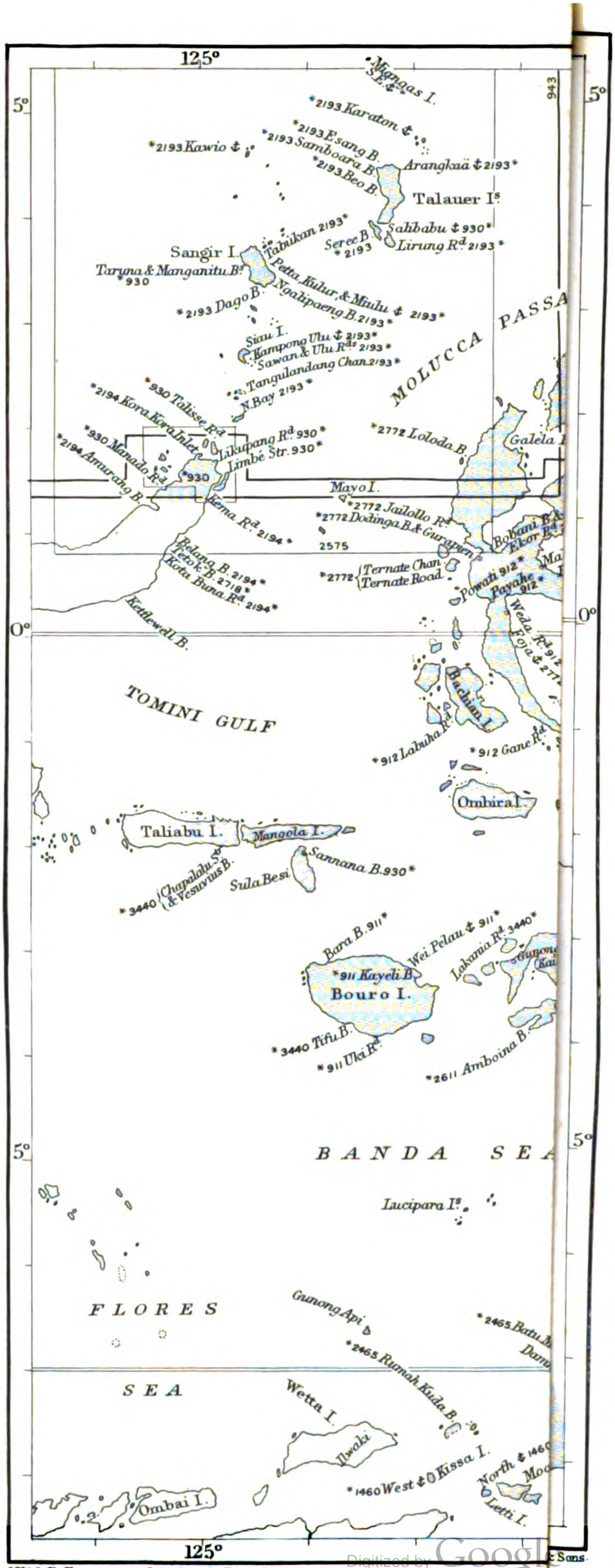
THE BEARINGS OF LIGHTS ARE GIVEN FROM SEAWARD.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO 100 FATHOMS, OR THE TENTH PART OF A MILE.

THE SOUNDINGS ARE REDUCED TO LOW WATER OF ORDINARY SPRING TIDES.

HEIGHTS ON THE LAND ARE GIVEN ABOVE HIGH WATER OF ORDINARY SPRING TIDES.



N°10 D Eastern Archipelago - Part 3

Sons.

For details of sectors and the latest information respecting the Lights which are included in this work, seamen should consult the Admiralty List of Lights, Part VI. This List is published early in every year, corrected to the preceding 31st December.

(8806) Wt. 33004/1029. 10,000.—1/11. T.G.E.

EASTERN ARCHIPELAGO PILOT, PART III.

(SOUTH-EASTERN PART).

CHAPTER I.

GENERAL REMARKS.—WINDS AND WEATHER.—CURRENTS AND TIDES.—COMMUNICATION.—BUOYAGE.

GENERAL REMARKS.—This volume contains a description of the south-eastern portion of the Eastern archipelago, namely, the islands that border the steam route usually followed from the China sea through the Celébes sea, Molucca passage, and Banda sea towards Australia; and includes a description of the N.E. extremity of Celébes, Gillolo, Ceram and Buru islands, and the western coast of New Guinea.

Want of surveys.—The greater part of the coasts and waters of the Eastern archipelago have as yet been very imperfectly surveyed. Even in the larger scale charts, founded on more recent examinations, omissions must be expected, as the irregular character of the depths and the prevalence of coral formations forbid any certainty that all dangers have been discovered.

TALAUER and TALAUTSE GROUPS are two groups of islands between Mindanao and Celébes. The Talautse group is entirely volcanic, and seems to be a continuation of the volcanic belt of North Celébes. Both groups are governed by their own Rajahs, under the Dutch Residency of Menado, in Celébes island, and carry on a trade in cocoanuts and oil with Menado and Ternate. There is regular steam communication with Celébes; *see* page 17.

CELÉBES ISLAND (Dutch) is the third in magnitude of the Malay archipelago. Its physical aspect as regards its form is most peculiar and fantastic, consisting of an irregular central body, from which radiate four long and narrow arms, forming three deep gulfs on the east side, while the west side has a curved and fairly regular coastline.

The northern peninsula, which is the only part of the island treated in this work, is a long and narrow curved strip of land extending

General charts 2575, 943, 942a.

over 6° of longitude, reckoning from Palos bay to its extremity; in some places it is only 10 miles in breadth, and nowhere does it exceed 40 miles. A range of mountains runs through it, the general height of which does not exceed 2,000 feet, though some peaks rise to 4,000, 5,000, and even 6,700 feet; the whole of the peninsula is rugged and mountainous. The north-eastern extremity of this peninsula constitutes the fertile and highly cultivated district of Minahasa, the capital of which is Menado (*Lat. 1° 30′ N., Long. 124° 50′ E.*). A considerable portion of Minahasa is a plateau from 2,500 to 3,000 feet above the sea, with mountains rising to 6,000 feet or more; this plateau is exceedingly fertile, producing abundant crops of rice, coffee, and oranges. There is regular steam communication with Singapore, Java, and other islands of the Eastern archipelago. *See* page 17.

MOLUCCAS.—(Dutch.) The term Moluccas, though originally applied only to the five small islands of Ternate, Tidore, Motir, Makyan, and Bachian, which lie off the western coast of the large island of Gillolo (Halmaheira), now includes all the islands lying between Celébes on the west, Timor on the south, and New Guinea on the east. The Moluccas may be divided into three groups—the *Northern* consisting of Gillolo, with a number of islands closely adjoining it, and extending as far south as the Ombi islands; the *Central group,* separated from the former by the Pitt passage or Serang sea, comprising the large islands of Ceram and Buru, together with Amboina and many smaller ones off the south-west coast of Ceram; and finally, the *Southern group,* which includes Banda, and the chain of islands lying between it and Timor, and which may be said to form a continuous belt extending from Timor to the Aru islands, and from these latter to the south-east coast of Ceram.

The Molucca islands are generally rugged and mountainous. They have an area of about 44,000 square miles, with a population estimated to be approximately 400,000. The government of the northern group is administered by the Resident of Ternate; of the central group by the Resident of Amboina; and the remainder by the Controleur of Banda.

Northern group.—Gillolo and Ternate have active volcanoes; that of Ternate has been in a constant state of activity for more than 200 years, during which period there have been no less than 14 eruptions, the last of which occurred in 1840, and was attended by great loss of property. Ombi is practically uninhabited, and but little known.

The trade consists of coffee, cocoanuts, tobacco, pepper, and dammar gum. The steamers of the Royal Netherlands Steam Packet Company touch at these islands regularly; *see* page 17.

General charts 943, 942a and b.

Ceram, or Central group. — The principal islands are Ceram, Buru, and Ambon or Amboina. Ceram is the largest of the Moluccas, though far from being of value proportionate to its extent. The island is little more than one mountain range, some of its peaks rising to the height of 6,000 and 8,000 feet above the sea, and the highest, Nusa Heli, to as much as 10,000 feet. The entire island is covered with a dense, unbroken forest, many of the trees being of stupendous growth. The eastern coast is bold and precipitous, and difficult of access; on the northern and southern coasts there are several deep and spacious bays, but no really good harbour. There is regular steam communication with Ceram; *see* page 17.

Buru.—With the exception of the broad bay of Kayeli, Buru is a compact unbroken mass of land of an oval form, apparently of sedimentary formation. The interior is a congeries of hill and mountain, divided by narrow valleys or deep ravines; the coast is alluvial and marshy. The soil is comparatively poor and sterile, and, beyond cajuput oil, there are no natural or vegetable products. Kayeli bay affords excellent and well-sheltered anchorage in both monsoons, and is much frequented by coasting traders from Makassar and Singapore. There is a large export trade in fish and cajuput oil. There is regular steam communication with Buru; *see* page 17.

AMBOINA (*Lat. 3° 38′ S., Long. 128° 12′ E.*), or Ambon, is the largest of a group of five islands lying about 10 miles distant from the south-west coast of Ceram. It contains but one volcano, which, though for several centuries in a state of eruption, has been quiescent since 1824. The whole island is hilly, but none of the mountains rise to any considerable elevation; the principal rocks are granite and serpentine, with much coralline limestone. The valleys are rich, being filled with decomposed volcanic ashes, but a large part of the island is arid and rocky, and unsuited for general agriculture.

Products.—Amboina and the other islands of the group have been long celebrated for their clove plantations, first introduced in 1651, but this spice has been gradually going out of cultivation. The pepper plant and cinnamon grow wild; coffee, cotton, and indigo are cultivated. There is an abundance and great variety of fruit, including the true or seedless bread-fruit tree, found only at Amboina.

Trade.—Amboina is the chief port of trade for the whole of the central and southern islands of the Moluccas. The principal articles of export are cloves, nutmegs, mace, birds of Paradise, copra, dammar, and mother-of-pearl shell.

Vessels of the Royal Netherlands Steam Packet Company call at Amboina regularly; *see* page 17.

General charts 942a and b.

BANDA or SOUTHERN GROUP.—In this group are the Banda isles, the Goram and Matabela groups, the Kei and Aru islands, and the Serwatti islands.

Banda isles (*Lat. 4° 30′ S., Long. 129° 53′ E.*), celebrated for their nutmeg plantations, consist of ten small islands all closely adjoining, situated about 60 miles from the south-east point of Ceram, and about 120 miles to the south-east of Amboina. The largest island is Banda Lontar, on which are most of the nutmeg trees; next to it in point of size is Banda Neira, which contains the principal Dutch settlement. The Banda islands are of volcanic formation, Gunong Api, an active volcano, being only the centre of what was once an enormous crater, of which Lontar, Neira, and the connecting islets form the rim, whilst those lying at a greater distance were gradually raised by the frequent discharges of volcanic matter. With the exception of the bare and ever-smoking cone of Gunong Api, which rises to a height of 2,033 feet, the islands are of moderate elevation, the hills, which seldom exceed 1,000 feet, being clothed with a rich and luxuriant verdure. The whole group is subject to frequent earthquakes, and has more than once been almost overwhelmed by eruptions from Gunong Api, which, however, has been quiescent since 1852.

Products.—Almost the entire surface is planted with nutmeg trees, which grow under the shade of lofty kanari trees, and flourish with but little attention. Cloves and a variety of fruit are amongst the natural products; coffee has been cultivated in recent years with success in some of the islands. There is a considerable trade in oil (extracted from the nuts of the kanari tree), birds-of-Paradise skins, pearl, tortoise-shells, and other products of eastern islands. In 1885 the total number of nutmeg estates was 34, the number of workmen employed on them being 2,869; the yield of nutmegs was 843 tons, of mace 150 tons, the value of which was about £90,000.

The vessels of the Royal Netherlands Steam Packet Company touch here frequently; *see* page 17.

Ceram Laut islands are a cluster of small islets lying about 6 miles off the south-east end of Ceram, of which the most important are Gisser and Kiliwaru. Kiliwaru islet is only a few feet above the level of the sea, but has nevertheless a large Bugis and Ceram population, and is greatly resorted to by traders from New Guinea, the Aru, Kei, and other islands, as well as by those from Celébes and Singapore. Trepang and edible birds' nests are the principal articles of trade. There is regular communication with Gisser; *see* page 17.

There is no Dutch settlement on Goram and Matabela. The natives are governed by their own chiefs, and are principally engaged in making cocoanut oil and betel-nut paste.

KEI or EWAF ISLANDS consist of the large island of Nuhu Yut or Great Kei (*Lat. 5°35'S., Long. 133°0'E.*), the two smaller ones, Nuhu Roa and Du Roa, and a number of islets which are situated about 180 miles south-east of the Banda isles and about 70 miles from the coast of New Guinea. These islands consist almost entirely of coralline limestone, and are covered with magnificent forests, which contain an abundance of fine timber trees, some of them said to be superior to the best Indian teak. Great Kei is mountainous, the land rising gradually from sandy beaches on either coast towards the centre, where a long ridge or back-bone, with peaks between 2,000 and 3,000 feet in height, extends through the island from north to south. The remaining islands are comparatively low, and encircled by extensive shoals.

The inhabitants are for the most part true Papuans, a mixed race, being found only on the coast. They are famous boat-builders, and traverse the entire archipelago, as far west as Singapore, in all seasons and weathers; Bandan Ellat, Bandan Eli, and Dulah (Ké Dulan) are the chief centres of this industry. These islands are but little cultivated, and the trade is in trepang, turtle, wood, and cocoanut oil; trade is carried on by means of barter.

The vessels of the Royal Netherlands Steam Packet Company call at Tual and Bandan Ellat regularly; *see* page 17.

ARU ISLANDS, about 65 miles east of the Kei islands, and 62 miles from the coast of New Guinea, consist of five principal islands and numerous smaller ones, extending 107 miles north and south, and 51 miles east and west. All the islands are of coralline limestone, the height nowhere exceeding 300 feet above the sea; and they are everywhere clothed with virgin forest.

The inhabitants are Papuans of various tribes, but generally inferior in physique to the Kei Papuans or the Mafors of Geelvink bay; the majority of them are in a state of utter barbarism.

The climate is said to be healthy except during the first months of the south-east monsoon, when fevers and cases of beri-beri are not uncommon. September and October are the driest months.

Products.—Trade.—There are valuable fisheries off the coasts. The exports comprise mother-of-pearl, pearl oyster, trepang, and birds of Paradise. Pigs and fruit are procurable.

Dobo is the great commercial centre for the trade of the whole chain of islands lying between Timor and New Guinea, as well as for the south-west coasts of the latter island itself; it is visited during the trading season, which sets in with the north-west monsoon, by several thousands of Bugis, Ceramese, Chinese, and other traders.

General chart 942b.

The vessels of the Royal Netherlands Steam Packet Company touch here regularly; *see* page 17.

SERWATTI ISLANDS.—Under this name are generally included the long chain of islands which extend from the east end of Timor towards the Aru islands, and which terminate in the Tenimber or Timor-laut group. These islands may be said to be divided into two nearly parallel chains, which approach each other off the coast of Timor. In the northern chain the principal islands are Wetta (not described in this book), Roma (*Lat.* 7° 35′ *S.*, *Long.* 127° 25′ *E.*), Damma, Tau, Nila, and Serua; while those of the southern chain are Kissa, Letti, Moa, Lakor, Sermata, and Babar.

The northern chain is, as a rule, rocky and mountainous, the hills being often bare of trees and the soil poor and sterile. All the islands are, however, pretty thickly inhabited, and many of the natives are Christians. There is but little cultivated ground, and the natives are chiefly occupied in fishing.

The southern chain of islands is of much lower elevation; the hills are generally well-wooded, and there are some extensive plains of good pasturage, as also a considerable amount of cultivation. Moa and Babar are the largest in this group. The cattle of Moa and Letti are of a superior breed to any in this part of the archipelago.

All these islands have a large and semi-Christianised population, who are much engaged in agricultural pursuits.

The islanders are divided into three classes, the *Marne*, or lords of the land, from whom the chiefs or rajahs are appointed by the Government; the *Boerstam*, who occupy an intermediate position, subordinate to the first-named; and the *Lascars*, or former slaves.

Nearly all these islands are visited by traders from Makassar, there being a considerable commerce in beeswax, pearl, tortoise-shell, and trepang.

The vessels of the Royal Netherlands Steam Packet Company touch regularly at Kissa, Letti, Damma, and Babar islands; *see* page 17.

Tenimber or Timor-laut group.—This is an extensive group lying at the eastern extremity of the Serwatti islands, and distant only 190 miles from the north coast of Australia. The largest island of the group is Timor-laut or Yamdena, and separated from this island to the north and south of it are the islands Larat and Selaru. To the north and west of these three principal islands is a continuous chain of outlying islets, only two of which—Molu and Seira—are of any importance.

These islands are with few exceptions low, the coast, which is much indented and encircled by reefs, being covered with cocoanut palms and thickets of mangroves, and fringed by precipitous coral bluffs from 60 to 80 feet high, on which the villages are placed. The inhabitants,

General charts 942a and b.

who were estimated to number about 25,000 in 1881, are a mixture of Malayan and Papuan races, and are industrious cultivators and fishermen; until within the last 20 years they have had scarcely any intercourse with Europeans. Fever is very prevalent. There are valuable fisheries off the coast.

Vessels of the Royal Netherlands Steam Packet Company call at Larat (Liling Luan) and Selaru regularly; *see* page 17.

PAPUA or NEW GUINEA.—History.—The earliest map of New Guinea was published in 1595 from information supplied by the Portuguese. Dom Jorge de Menezes wintered here, probably in the neighbourhood of Geelvink bay, in 1526, and hence may be considered the discoverer. In 1528, Saavedra sailed along the north coast, and called it Isla de Oro, but in 1545 this name was changed to New Guinea by Ortiz de Retes, one of the captains under the Spanish navigator Villalobos. Of the north coast of New Guinea the earliest information comes from the Dutch navigators Lemaire and Schouten, who, in 1616, discovered and traced a considerable portion of the coast westward of the present Cape D'Urville (*Lat. 1° 26′ S., Long. 137° 49′ E.*); this part was also seen by Dampier in 1700.

In 1705 a Dutch expedition under Jacob Weyland discovered and mapped Geelvink bay. In 1794, Captain Forrest, of the East India Company's service, visited the north coast in a little vessel of 10 tons, and 20 years later Captain McCluer arrived on the north-west coast to succour the survivors of an attempted settlement by Captain Hayes of the East India Company's ship *Batavia*.

The Dutch Government first supported, and eventually assumed as suzerains, the claims of a Moluccan ruler, the Sultan of Tidore, who had long held supremacy over Papua, thereby meaning the extreme western portion of New Guinea and some districts in the neighbourhood of Geelvink bay. They have therefore despatched several small exploring expeditions to these coasts, and their territory is now as described on page 9.

Extent and area.—The island of New Guinea forms, as it were, a connecting link between the Eastern archipelago and the Polynesian group, and the western portion of it only falls within the limits of this work. The northern point of New Guinea lies about 19 miles south of the equator, and the island extends through rather more than 10 degrees of latitude and 20 degrees of longitude, its length in an easterly and westerly direction being 1,306 miles, while its area, including that of the adjacent islands, is about 312,000 square miles.

Its contour is irregular, the central part being about 370 miles wide, whence it stretches westward in a long and gradually narrowing peninsula, forming at the head of Geelvink bay an isthmus about 35 miles in breadth; further west, the peninsula, which has again broadened out, is penetrated from the west by McCluer inlet, leaving a neck of land only about 20 miles wide between it and the western side of Geelvink bay.

This vast island is generally mountainous on its northern coast, and also at the extreme west of the above peninsula; the south coast eastward of long. 135° E. is low and swampy, covered with gigantic trees, and bordered in places by a broad belt of mudbanks which stretch seaward to a distance of 9 or 10 miles. Westward of the above meridian, the entire coastline as far round as and including Geelvink bay is closely fringed by a succession of islands, many of them being of considerable size. The interior of the island is but little known, but it is covered with dense forests, as is also the greater part of the shores.

Inhabitants.—The inhabitants of New Guinea comprise distinct races, but above all is the well-marked Papuan type, of which this island is the centre, and it would appear that the most typical examples are to be found in the northern peninsulas; a lighter-coloured race is found in the south-eastern part of the island, and they are the more civilised of the two. They average about 5 feet 3 inches in height, and are of a light, active build, often with good features, which they paint, but are disfigured by the nose and ear ornaments and the constant use of betel-nut. Both sexes go almost naked, except in the neighbourhood of the mission stations, and in some inland districts that have not yet come under control they are cannibals. Their weapons are bows and arrows, wooden spears and swords, clubs, slings, and stone hatchets. Caution should be exercised in dealing with them.

The south coast natives are considerable traders, frequently making long voyages, and trading with sago, pottery, ornaments, &c. The trading canoes are huge and unwieldy, and are very bad sailers; they are composed of three canoes lashed together, with bulwarks built on, and at each end is a covered place for sleeping in.

Sorcery and superstition are of so much importance with these natives that it should be taken into consideration in all dealings with them; and their ideas on these subjects are so foreign to those of white men, that it cannot be wondered if the latter sometimes unintentionally offend native prejudices, and consequently suffer from the results of their inexperience.

The houses are built, after the Malay fashion, on poles raised 5 or 6 feet from the ground. Their fishing nets are similar to an English seine.

Political divisions.—The island of New Guinea is divided between the British, Dutch, and Germans. In 1885, the portion of New Guinea lying to the eastward of the 141st meridian was divided

General charts 942b, 2759a.

between Great Britain and Germany; that to the westward belongs to the Netherlands.

That part of the island with which this book deals lies entirely in Dutch territory.

Dutch territory.—The western portion of New Guinea, with the off-lying islands west of the meridian of long. 141° E., is Dutch territory. For the purpose of getting a definite boundary, the mouth of the Bensbach, a small river in about long. 141° 2′ E., has been accepted as the boundary between British and Dutch territory on the south coast of New Guinea, until this meridian meets the Fly river, when that river becomes the boundary until it cuts the meridian of 141° E., which meridian is the boundary on the north coast of New Guinea, a few miles westward of Germania point.

Dutch New Guinea is said to have an area of 151,789 square miles, and to contain a population of about 200,000; this latter number is, however, mere conjecture. The only Dutch settlements at present are at Dorei bay, a small inlet on the western shore, and just within the entrance to Geelvink bay, Fak Fak on the western coast, and Merauke on the southern coast; Merauke and Dorei are outside the limits of this book.

Trade.—The chief trade is in copra, nutmegs, trepang, and tortoise-shell, birds-of-Paradise skins, dammar, and *masoi* bark. Vessels of the Royal Netherlands Steam Packet Company call regularly at Segaar bay, Sorong, and Fak Fak on the west coast, at Saonek, near Waigiu island, and when necessary at Samatti in Salwatti island. *See* also Pacific Islands, Vol. I., 4th Edition, 1908.

NETHERLANDS INDIA.—Steering commands.—Pilots.—In the ports of Netherlands India, the steering commands used by pilots are "Bakboord uit" and "Stuurboord uit" (literally "Port out" and "Starboard out"). These orders apply to the direction to which the ship's head is intended to turn and not to the tiller.

Police regulations.—Regulations relating to foreign men-of-war entering and anchoring on the roads or in the outlets, in the harbours and the rivers of Netherlands East Indies (*Official Gazette of Netherlands India, 1905, No. 513*).

ARTICLE I.

1. Wherever men-of-war are mentioned in the following regulations, this term applies to:—

(*a*) Any foreign man-of-war belonging to Powers friendly to the Netherlands;

(*b*) Any vessel having military troops on board belonging to Powers friendly to the Netherlands.

ARTICLE II.

1. A notice of the entrance and anchorage of a foreign man-of-war on a roadstead or in an outlet, harbour, or a river of the Netherlands Indies shall immediately be sent—and, if possible, by telegraph—to the naval commander-in-chief by the principal civil authority of the place.

In the possessions outside of Java and Madura, similar notice shall also be sent to the Head of the Governmental Administration, in case he be not himself the principal civil authority of the place.

ARTICLE III.

1. To the commander of any foreign man-of-war entering into or anchoring on a roadstead or in an outlet, harbour, or a river of Netherlands India, the harbour master, or, in his absence, the official acting as such, shall present:—

(*a*) A copy of a French, German, or English extract from these regulations;

(*b*) A form issued by the naval commander-in-chief in the French, German, or English language containing interrogatories respecting: flag, charter, name, crew, armament, whence hailing, length of voyage, proposed length of stay, destination, state of health, &c.

2. A copy of the form, duly filled in, shall be transmitted without delay to the naval commander-in-chief and to the Chief of the Governmental Administration.

ARTICLE IV.

1. The crew of foreign men-of-war within the boundaries of the Dutch Indies shall not be allowed to make any hydrographical or land surveys, nor to engage in disembarking drill, nor, except as provided in Article V., to engage in target practice.

2. The crew shall only be allowed to come ashore unarmed, exception being made on behalf of the officers and non-commissioned officers, who are permitted to carry the sword or dirk pertaining to their uniform; the boats belonging to the vessels, when used, as well as their crew, shall be unarmed.

3. The previous clause does not apply to cases of *vis major*.

4. If for particular reasons—for instance, in the case of a funeral on shore—exemption be desired from the prohibition contained in clause 2 of this article, the permission can be obtained in the chief towns of governments from the Head of the Governmental Administration and in other places from the principal civil authority of the place.

ARTICLE V.

1. The commander of a foreign man-of-war staying at Batavia can be granted a permission for rifle practice ashore.

2. The application for the above-mentioned permission shall be made by the said commander to the naval commander-in-chief.

3. In case there be no objection to grant the request, the naval commander-in-chief sends a declaration to the commander in question, acquainting the latter with place and time, where the exercises can be carried on, and with the number of the rifle ranges which are at his disposal.

4. A naval officer is always attached to the leader of the shooting practice, in order to afford all necessary information respecting the organisation of our rifle ranges and to see that the prescriptions are followed.

5. The naval commander-in-chief acquaints the Head of the Governmental Administration by telephone of the foresaid permission and of the exact time when the shooting will take place.

ARTICLE VI.

Within the boundaries of Netherlands Indies foreign men-of-war have to respect the existing legal regulations.

ARTICLE VII.

1. Should any man-of-war infringe any of the foregoing regulations, the principal civil authority of the place may, if possible in conjunction with the Central Government, order the vessel to withdraw, and, if necessary, the principal civil authority may use force to compel the vessel to withdraw, but before doing so he must first consult the competent naval and military authorities.

2. In this latter case the competent naval or military authority shall enforce obedience by firing a live shot past the vessel at a distance of about five hundred metres, and then by firing a second shot at about half the distance of the first, and, if necessary, by further firing with live shots over the vessel, or into the riggings, and finally into the hull.

ARTICLE VIII.

1. The Government pilots shall be made acquainted with these regulations, and be advised by the harbour master, or by the official acting as such, whether a salute to the Netherlands flag can be returned, and if so, from what point.

2. They shall, as far as necessary, inform of the aforesaid the commander of the foreign man-of-war and afford him with all information he may require with regard to the above-mentioned regulations.

ARTICLE IX.

1. The regulations apply to men-of-war belonging to Powers which are involved in war and on friendly terms with the Netherlands, as long as no other regulations for the maintenance of neutrality have been made during or after the outbreak of the war.

2. In case of a war in which the Netherlands are engaged, the same regulations will be enforced, so long as nothing to the contrary has been decided.

WINDS and WEATHER.—Celébes sea.—In the Celébes sea there is but little westing in the wind, the prevailing direction of the monsoons being southerly from the latter part of May to October, and N.N.E. to N.E. from November to April, being at its maximum in February and March. Generally the monsoons are the better marked the more eastward we go. In the south-west monsoon, between Mindanao and Celébes islands, sudden storms from the N.W. take place.

Much rain falls about Basilan and the north end of Celébes island, whilst fine but overcast and sultry weather occurs in the middle of the Celébes sea.

Molucca passage.—In the Molucca passage the monsoons are strongly marked; the wind rarely blows from the eastward. The northerly monsoon sets in during November, and becomes established in December, the wind increasing in steadiness and veering from N.N.W. to N.E. It is at its strength in February and March, and begins to abate in April, but still bears a decidedly northerly character. In May the winds are variable, beginning to blow from south and S.W., though north-westerly winds are also experienced. By June the south or S.S.W. monsoon is established, and it gradually increases in force and steadiness until August, when its height is attained. In October the monsoon diminishes in strength and northerly winds occur.

Although the monsoons are generally so steady, variable winds are frequent, and there is often rain during both monsoons. The greatest amount of rain falls in June and July, and in a lesser degree in January. September and October are the driest months, after them February and March. Heavy squalls rarely occur; the sky is more clouded than in the Celébes sea.

Molucca sea.—In the Molucca sea the monsoons are well marked and blow from N.N.W. and S.S.E., separated by two months, April and November, in which the monsoons turn; they are pretty strong and steady; there are frequent showers and rather overcast and hazy skies. The S.S.E. monsoon sets in during the latter half of April, and gradually increases in steadiness and force till July and August, when both these characteristics are at their height; in October the steadiness decreases and the force grows weaker. In November the wind is more from the S.W. than other directions, but is generally very feeble and cannot be depended on; calms and variable winds frequently occur. In December the N.N.W. monsoon sets in, and the wind may be anywhere in the north-west quarter. In January and February the monsoon is at its height, but neither steadiness nor force are so great as during the S.S.E. monsoon. In March the monsoon begins to abate;

Admiralty Wind and Current Atlas for the Pacific, &c.

in April the weather is unsettled, and the wind may be expected from any direction, though mostly from the N.W.

June, July, and August are the wettest months; September, October, and November the driest. Squalls are more frequent in December and January. Thunder-storms mostly occur at the change of the monsoons in April, May, and November.

Pitt passage or **Serang sea.**—In the Serang sea the eastern monsoon, during which S.S.E. winds prevail, sets in about May, but the winds are light and variable and they continue so, more or less, throughout June. In July, August, and September the monsoon is at its height, but variable winds are frequent; in October, though S.S.E. winds still dominate, the monsoon begins to abate. November is a period of transition between the monsoons, and winds from all quarters are experienced. The western monsoon, when N.W. winds are the most prevalent, blows from December to March, but variable winds are very frequent. In April, W.N.W. winds prevail, though they are of little force, and practically there is no monsoon. The influence of the Australian S.E. monsoon is scarcely felt northward of Ceram, where the wind is generally of little strength, and uncertain in direction.

The rainfall is rather heavy during all months throughout the year, but well-marked seasons do not occur, though a slight maximum is observable from April to June. Heavy squalls are rare. Thunderstorms occur only at the transition-epochs of the monsoons.

Banda sea.—The easterly monsoon sets in during April, when S.E. winds begin to prevail; they become settled and strong in May, continue with unabated force until August, and gradually decrease in strength during September and October. In November S.E. winds still prevail, but west and N.W. winds are at times experienced. The N.W., or westerly monsoon, begins in December, is at its height in January and February, and continues with great force and regularity until March; when it decreases considerably but still prevails, though easterly winds occur. March and April may be considered transition months.

The atmosphere is generally very hazy in the northern part of the Banda sea, becoming less dense on proceeding southward, and when well south there is usually a clear sky. In the northern part of this sea the rainfall is pretty heavy throughout the whole year, so that the dry and wet seasons are not sharply defined; the wet season lasts from May to August; the driest months are September, October, and November. In the southern portion of the Banda sea the rainfall appears to be rather heavy from December to February with occasional heavy squalls, and moderate from March to June, while the dry season lasts from July to October or November; it varies greatly, however, in different localities. Heavy squalls and thunder-storms are rare.

Arafura sea.—In the Arafura sea, which separates the north coast of Australia from the chain of islands to the northward, the periodical south-east monsoon (the extension of the south-east trade) and north-west monsoon prevail. The south-east or easterly monsoon, with prevailing south-east and east-south-east winds, begins in the latter half of March or early in April with squally, rainy weather, but in a week or 10 days it becomes settled, and blows with great steadiness from the latter month to October, attaining its full vigour in June, July, and August, when strong easterly winds may be almost absolutely counted upon. During the strength of the monsoon there is usually a considerable sea. In October the monsoon begins to abate, and in November cannot be relied on, though south-south-east winds still prevail when not in proximity to the land.

The westerly monsoon begins in December and lasts until February, but its steadiness is not so great as that during the easterly monsoon, calms and variable winds occurring frequently; the force of the wind, however, is pretty considerable when the monsoon is at its height. At the beginning of March the monsoon becomes variable, with dark, cloudy, and unsettled weather; the wind is then generally from south-west, but not at all regular.

In the southern part of the Eastern archipelago the south-east monsoon is attended with fine weather, but on the south-west coast of New Guinea and among the islands to the westward as far as the coast of Celébes, frequent squalls with heavy rain are experienced at this season, often accompanied with considerable swell from the southward, while during the remainder of the year the weather is fine.

The rainy season lasts from November to July, January and March being the wettest months; rain is least frequent in August, September, and October. Throughout the whole year the sky is very cloudy, and showery weather may be expected, especially in the vicinity of the high islands; heavy squalls, mostly accompanied with thunder and a downpour of rain, are experienced during the westerly monsoon only, and occur mostly from December to February. Calms are not frequent.

New Guinea.—On the west coast of New Guinea there are also two monsoons, the south-east lasting from April to October, and the north-west beginning at the end of October and terminating towards April. In October the weather is often changeable. In January, near this island, the wind sometimes varies from N.N.W. to N.E. In March, April, and May it is squally. From June to September a great deal of rain falls; from October to May the weather is fine and calm, without either cloud or fogs.

Admiralty Wind and Current Atlas for the Pacific, &c.

GENERAL REMARKS.—From the foregoing the following general remarks on the winds and weather of the Eastern archipelago have been deduced.

North of the equator.—North-easterly winds prevail from December to March inclusive. This is the fine season, the winds blowing strong and steadily.

Southerly winds prevail from May to September inclusive. This is the wet season, and the winds are variable in force and direction, with bad weather. Sudden and violent squalls from the north-west occur in the Celébes sea.

October and November are unsettled months; the north-east monsoon not being fairly established before the middle of December.

South of the equator.—West and north-west winds shifting to north-east prevail from November to March. On coasts having a northern aspect, land and sea breezes, with unsettled weather and rain, will be found.

South-east and east winds prevail from May to September, generally fresh and steady, with fine weather on coasts with a northern aspect, but bringing rain and bad weather to coasts open to the southward.

Rainy seasons.—In this archipelago, situated as it is in the vicinity of the equator, and within the regions of calms and doldrums caused by the meeting of the northern and southern wind systems, the wet and dry seasons are not strongly contrasted, as a great amount of rain falls more or less all the year round. The same monsoon is often stormy at sea but fine near the land; as a rule, bad weather with rain is felt on coasts and islands that lie to windward, whilst leeward coasts enjoy fine weather. *See* Table, page 324.

CURRENTS.—Equatorial current and counter current.—The westerly equatorial drift in the North Pacific, caused by the North-east trades, extends towards the equator from about lat. 25° N. on the eastern side to lat. 20° N. as the Asiatic islands are neared. In the South Pacific that caused by the South-east trades will generally be found to extend from about lat. 20° or 25° S. to and considerably northward of the equator, its further southern limit being towards the American side of the ocean. Near the equatorial limits of these currents the set is almost due west (true), but between them is the counter equatorial current setting in the opposite direction and sometimes with considerable strength.

Though the limits of the counter current are imperfectly defined, it appears to lie always northward of the equator, generally between the parallels of 4° and 9° N. lat., more commonly between 5° N. and 8° N., though sometimes its influence has been felt almost down to the equator, and it never exceeds five degrees in width. It varies greatly in

Admiralty Current charts for the Indian and Pacific Oceans, &c.

strength, running from half a knot to 2 knots an hour, and so far as is known with the season also, being stronger from May to October than during the other half of the year, when it sometimes appears to cease.

In the Molucca passages the current sets with the wind, its strength depending very much on the force of the wind, seldom exceeding a knot an hour. During the north-east monsoon of the northern hemisphere it appears to be stronger on the east coast of Celébes than on the west coast of Gillolo. On the north coast of Ceram counter-currents prevail close in-shore during the south-east monsoon of the southern hemisphere.

Banda and Arafura seas.—During the south-east monsoon the current sets to the north-west along the western coast of New Guinea, and between the Kei and Aru islands, and thence westward along the south coast of Ceram, at the rate of one or 1½ miles an hour, according to the strength of the wind, the velocity being greatest along the coast of New Guinea. At the same period an easterly current prevails on the north side of the Serwatti islands, between Timor and the Tenimber group, setting to windward, so that a moderately fast-sailing vessel would experience no difficulty there in beating up against the monsoon. In the north-west monsoon, the current in these seas usually sets with the wind.

TIDES.—The observations on tides in the area covered by this book are neither numerous enough nor complete enough to permit of accurate generalisations being made.

They are affected by a diurnal inequality, especially of height, causing a difference between the heights of successive high and low waters, which varies throughout the lunation, and sometimes attains large proportions.

The difference may be almost imperceptible, or may be so great that the movement of the water between the lower high water and higher low water is reduced to a mere stand in the level of the water, giving the effect of only one high and low water during the 24 hours.

The time of high water is generally the most regular feature of the tides and follows the time of the moon's transit as usual.

Observations are wanting as to the streams between Timor Laut and Timor; but south of Timor the rising stream sets towards the east.

COAL.—The Netherlands Government have stocks of coal at Ternate, Talisse (Talisei), Amboina, a small quantity at Tepa in Babar island, and at Fak Fak, but at these places the supply to ships is uncertain. For details, *see* the body of the work.

COMMUNICATION.—Dutch colonies.—The following services are carried out by the vessels of the Royal Netherlands Steam Packet Company.

From Singapore every fortnight to Batavia, Surabaya, Makassar, Amboina, Banda Neira, and back to Amboina; every alternate voyage Tifu (Buru) is visited after Makassar.

From Amboina every fortnight to Banda Neira, Makassar, Java ports, and Singapore, calling at Tifu every alternate voyage.

From Amboina every four weeks to Kayeli (Buru), Sannana, Laiwui (Ombi Major), Bachian, Ternate, Galela (Gillolo), Tobelo, Kau, Ake Selaka, Buli, Gam Sungi (Patani), Weda, Sorong, Saonek, and some ports in North New Guinea as far as Humboldt bay and back, calling at the same ports. Note.—On this route Kayeli, Sannana, Kau, and Saonek are visited only on every alternate voyage.

From Amboina about every four weeks to Saparua and Amahai, whence every alternate voyage proceeds by Piru, Kayeli, Wahai, Kokas (Segaar bay), Fak Fak, Gisser, Banda Neira, Tuluti bay, Amahai, Saparua, and Amboina. The other alternate voyage after Amahai, the second port of call from Amboina, proceeds by Tuluti bay and the other ports named before it in reverse order as far as Piru, from which place the vessel returns to Amboina.

From Amboina every four weeks to Banda Neira, Tual, and Dobo, whence every alternate voyage continues to Liling Luan (Larat), Adaut (Selaru), Tepa (Babar), Dobo, Merauke, Dobo, Bandan Ellat, Tual, Gisser, Banda Neira, Saparua, and Amboina. The other alternate voyage from Amboina, after Dobo as third port of call, proceeds by Merauke, Dobo, Tepa, Adaut, Liling Luan, Dobo, Bandan Ellat, and the other ports after that place mentioned above, back to Amboina. Note.—Wulur (Damma) is also visited on this route, but on every third voyage only.

From Singapore every fortnight, calling at Java ports, Makassar, Borneo, and W. Celébes ports to Menado, thence to Tangulandang, Siau, Taruna, Lirung, Petta, Tamako, Taruna, Siau, Tangulandang, Talisse, and Menado. Note.—Of these ports Tangulandang, Lirung, Tamako, and Talisse are visited on every alternate voyage only.

From Menado the vessel then visits eastern Celébes ports, calling at Ternate on alternate voyages, and returns to Menado, thence to Singapore by Makassar and Java ports.

From Makassar every four weeks to Menado and back, calling at western Celébes ports.

From Singapore every four weeks to Port Darwin and back, calling at various ports including Kissa and Serwaru (Letti).

From Batavia, once a month by the Java-Australia line to eastern ports of Australia and as far as Melbourne and back, calling at Dobo occasionally.

DIRECTIONS FOR MAKING PASSAGES.

For directions for making passages through the area covered by this book, the mariner is referred to Eastern Archipelago Pilot, Part I.

COMMERCE.—Dutch colonies.—The chief exports from the colonies mentioned in this work are cacao, canes, cloves, copal, copra, dammar, ebony, nutmegs, mace, mother-of-pearl shell, and birds' skins.

Imports.—Cotton goods, mercers' wares, provisions, and coal.

Most of the trade of the Dutch colonies referred to in this work is carried on with Java.

UNIFORM SYSTEM OF BUOYAGE.—Netherlands East Indies.—

1. The term *starboard* hand means that side which would be on the right hand going with the main stream of flood, or in entering a harbour, river, or estuary, from seaward; the term *port* hand means the left-hand side, under the same circumstances.
2. Conical (nun) buoys are starboard hand buoys as thus defined, and are painted red.
3. Can (truncated) buoys are port hand buoys as thus defined, and are painted black.
4. Spherical buoys, as a rule, are placed at the separation of two channels, or mark the ends of middle grounds, and are painted black and red in horizontal stripes; if additional buoys lie between those at the ends of shoals, they are painted in a similar manner. Spherical buoys are always surmounted by top marks, other buoys only in special cases.
5. Buoys lying outside, and marking the approach to seaward channels are of a special shape, and are painted red and black in vertical stripes.
6. The buoys marking the outer shoals remain as at present.
7. Wrecks are marked by conical or can buoys, painted green, according as the wreck lies on the starboard or port side of the channel. Should the wreck be in mid-channel, it will be marked by a can buoy on one side, and a conical buoy on the other side, which buoys are to be treated as port or starboard hand buoys according to shape.
8. The top marks are as follows:—

   A diamond marks the outer or seaward side of a bank.

   A cone marks the inner side of a bank.

   A ball marks the starboard side of the channel.

   A truncated cone marks the port side of the channel.

   A cross is used as a special mark, and surmounting a spherical buoy indicates that the buoy may be passed on either side.

   The ball and truncated cone are also used as top marks for beacons.

   The top marks are of the same colour as the buoys or beacons on which they are placed.

9. Channel buoys are numbered consecutively (beginning from seaward), and marked by the first letter of the name of the channel. The numbers and letters are white.

This uniform system of buoyage will gradually be adopted, as regards the shape of the buoys and top marks, whilst the alteration in colour will only be made when all else has been changed in accordance with the new system. For this reason, it is necessary during the period of transition that attention should be exclusively given to the colour (as has hitherto been the case), and not to the shape of the buoys; the existing colours, black and white, remaining temporarily unaltered.

Light-vessels.—The Netherlands light-vessels show an anchor light in addition to the distinguishing light.

CHAPTER II.

ISLANDS BETWEEN MINDANAO AND CELÉBES AND N.E. END OF CELÉBES ISLAND.

VARIATION IN 1911.—Increasing about 1½ minutes annually.

Chart 2575, Eastern part of the Celébes sea. Var. 1° 40′ E.

Miangas or Palmas island (*Lat. 5° 35′ N., Long. 126° 36′ E.*), lying about 75 miles east of Tinaka point, the south end of **Mindanao,** is about 300 feet high, and one mile in extent east and west.

Plan of South-east anchorage on chart 2575.

Anchorage may be had in a small open bay at the south-east part of the island, in a depth of 19 fathoms, with a flagstaff near the shore in the bight of the bay bearing N.W., distant 2¼ cables; the shore reef extends off to the distance of about half a cable. The tidal streams are very strong. *See* view *a*, at page 22.

Chart 2575, Eastern part of the Celébes sea. Var. 1° 50′ E.

NANUSA ISLANDS.—(Meangis of Dampier).—This group consists of seven islands. Gerama (Garata), the north-western island, is low; Karaton island, 3½ miles southward of Gerama, is generally flat, but has a peak about 200 feet high on its northern side; on the south-eastern side there is anchorage; *see* next page.

Merampi (Mengampit), 2 miles eastward of Karaton, is densely wooded, and rises gradually from the shore to a height of 666 feet, rounded gently at the summit, which appears bare, with the exception of some cocoanut palms along the ridge. On the south and south-west sides are three villages.

Menkopu (Mangnupu), 1¾ miles southward of Merampi (Mengampit), is low and wooded.

The three southern islands stand on the same reef, which extends 3¾ miles in a north-east and south-west direction. Kakarutan (Marokka) island lies 6 miles south-eastward of Karaton, and is flat and densely wooded; turtle abound here. Maroka (Onrata), the southernmost of the islands eastward of Kakarutan (Marokka), is a small peaked islet 266 feet high, visible more than 20 miles off. Itata, low, flat, and densely wooded, lies northward of Maroka (Onrata); in the passage between there are several rocks above water.

The number of inhabitants is 1,130; they live by fishing and cultivating maize and yams. Karaton, Merampi (Mengampit), and Maroka

General charts 2575, 943, 1263.

Chart 2575, Eastern part of Celébes sea. Var. 1° 50′ E.

(Onrata) are the only islands inhabited. Water at Karaton is very bad; it comes from an inland spring.

The islands are under the residency of Menado, represented by the Controleur, who resides at Lirung in Salibabu island.

Dangers.—All the islands are surrounded by reefs. The chart shows a reef between Gerama (Garata) and Karaton; another about 3½ miles southward of Karaton, and a third between Menkopu (Mangnupu) and the southern group.

Plan of Karaton anchorage on 2193.

Anchorage (*Lat. 4° 45′ N., Long. 127° 4′ E.*).—There is anchorage on the south-east side of Karaton off the village of that name, in about 13 fathoms sand, with the flagstaff bearing N. 36° W., distant about a quarter of a mile, and the south-east point of the island S. 58° W. Landing is not easy with any sea. There is also said to be anchorage off the north-east coast in from 9 to 14 fathoms, coral bottom.

Current.—During the 8 hours the *Challenger* was dredging, in a depth of 500 fathoms, southward of the group, in 1875, there was a constant current to the south running at the rate of one mile an hour.

TALAUER ISLANDS are under the residency of Menado, represented by a Controleur, who resides at Lirung. Karakelang, the northernmost of the group, is 34 miles long north and south, and 13 miles wide at the northern part. The southern part of the island is reported to be about 2,300 feet high. The coast is generally steep, except on the south side, which is fringed by a reef nearly a mile wide. Off the edge of the west end of the above reef, in the passage between the islands Karakelang and Salibabu, there is a shoal with a depth of 7 fathoms. From the south point of the island discoloured water extends a considerable distance in the direction of the northern Saha island. A sunken reef, with a depth of about 2 fathoms on it, lies 1½ miles southward of Karakelang island, with the south-east extreme of Saha kechil island, bearing S. 41° W., distant 2¼ miles. Tanjong Ambora, at the north end of the island, has a small reef extending off it. The fringing reefs on the east side of the island are very narrow. About the middle of the west side and near the shore are two small islands, the larger and northern of which is named Nusa or Jolly. Nusa has a reef extending south-westward from it, and the other island is surrounded by a reef which extends half a mile seaward. *See* view *b*, at page 22.

Many natives are Christians, and there are two missionaries. Malignant fevers are often prevalent on the coasts: in 1885, cholera and fevers carried off all the inhabitants of some villages.

General charts 2575, 943, 1263.

Plan of Esang bay on 2193. Var. 1° 50′ E.

ANCHORAGES. — Esang bay (*Lat. 4° 26′ N., Long. 126° 42′ E.*), on the west coast of Karakelang, is about one mile wide at the entrance, and three-quarters of a mile deep. Both entrance points are surrounded by reefs, that at the south point extending northward over 1½ cables, while that at the north point is narrow. Shoal water extends from 2 to 3½ cables from the shore. The River Esang flows into the middle of the bay, and the village of the same name lies southward of the entrance. In the dry season the river water is brackish. Farther north are the Larue river and the village of the same name. The Esang river can be entered by light craft after one hour's flood.

The bay affords good anchorage in southerly or easterly winds. The best anchorage is in the southern part of the bay, about half a mile N. 80° W. of the village flagstaff, in 15 fathoms of water. The depths in the northern part of the bay are irregular. Landing can be effected nearly always under the lee of the reef which extends off the south point of the bay.

Plan of Samboara bay on 2193.

Samboara bay, or Batu Baranggo, lies about 2 miles south of Esang bay, and is open to the westward. There is temporary anchorage during easterly winds in the northern part of the bay, in about 20 fathoms, but only about 150 yards from the shore reef. Water may be obtained from a stream running into the south part of the bay.

Plan of Beo bay on 2193.

Beo bay, about 7 miles south-eastward of Nusa island, is difficult to make out when approaching from the southward. On the south side of the bay stands a large remarkable tree, to the right of some houses; westward of this tree is a row of small trees in the water, which form the south point of the bay.

There is anchorage in 7 fathoms, mud and sand, about a quarter of a mile north-westward of the river entrance. The bank is very steep, and reefs and shoal water extend from one to 1¾ cables from the shore.

Off Torogan, about 4½ miles south-westward of Beo, anchorage is found in 19 fathoms, sand and coral bottom, with the village bearing S.E.

Plan of Arangkaä anchorage on 2193.

Arangkaä anchorage is in a bay on the north-east coast of Karakelang. The village of Arangkaä lies on the north side of the bay, and the villages of Taruan and Bunĕh on the south side.

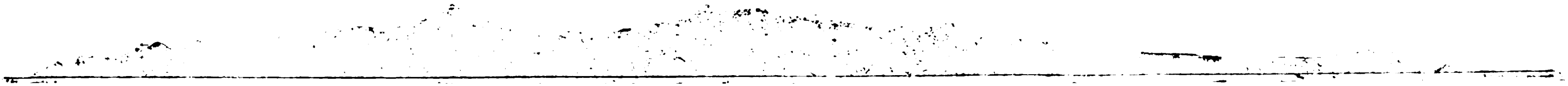
General charts 2575, 943, 1263.

(a)

S.E. point.
S. 47° W. 2¼ cables.

Miangas or Palmas island, from anchorage on south-east side.

(b)



Karakelang island from the northward. N.W. point S. 11° E. distant 15 miles.

(c)

Siau and Makaleheh islands from the west-south-west.

Plan of Arangkaä anchorage on 2193. Var. 1° 50′ E.

Nusa islet lies on the shore reef, about 3 cables northward of the village of Arangkaä.

There is anchorage in 27 fathoms, sand and mud, about 3 cables south-eastward of the village.

Chart 2575, Eastern part of the Celèbes sea.

Haimis bay, on the south-eastern side of the island, affords anchorage in the northern part of the bay, in about 20 fathoms, with the flagstaff of Haimis village bearing N.W. by W. ½ W. In the southern part of the bay there is less water. The bay is quite exposed to easterly winds.

Salibabu island lies southward of Karakelang island, separated from it by a passage about one mile in width. It may be recognised by a saddle hill situated about in the middle of the island. The islands Saha besar and Saha kechil lie in the southern entrance of the channel, between Salibabu and Karakelang; they are both densely wooded, and have a beach of sand, here and there varied by large rocky lumps of coral. The channel between these islands and Salibabu, about half a mile wide, is clean. In the channel between Salibabu and Karakelang a large reef extends from the coast of the former island; for dangers in this channel, *see* under Karakelang island.

The north and south points of Salibabu island are surrounded by reefs; from the eastern point a sandspit projects, with a depth of 30 fathoms near it, which depth continues along the north-east side of the island to the village of Lirung.

Plan of Lirung road on 2193.

ANCHORAGES. — Lirung road (*Lat. 3° 56′ N., Long. 126° 42′ E.*) is situated about 2 miles north-westward of the east point of Salibabu, in front of the village of Lirung. The limits of the road are two lines drawn in a N.E. ½ E. direction from the shore through the western extremes of Saha kechil and Saha besar, respectively, and the road extends 3 cables from the shore between these lines. There is safe anchorage in both monsoons in about 20 fathoms, sand, with the village bearing S.W. ½ W., distant about 3 cables, or about 2 cables farther west in 17 fathoms, sand, mud, and stones, with the flagstaff bearing S. 16° W. and the north-west point of Saha besar N. 75° E. With north-east and north-west winds there is a little swell. The tidal streams in the road are not strong; the flood sets to the north, and the ebb to the south.

Light.—An occasional *red fixed* light, visible 2 miles, is shown near the flagstaff on the arrival of ships.

General charts 2575, 943, 1263.

Plan of Lirung road on 2193. Var. 1° 50′ E.

Supplies.—Few supplies are to be had. Hogs, goats, fowls, and sweet potatoes can be procured, and there is a store kept by a Chinaman. Water may be obtained from a stream, and from wells, but is not always fit for drinking. The best place to land is on the sandy beach near the flagstaff, where there are no stones.

Communication.—Lirung is visited once every four weeks by a steam vessel of the Royal Netherlands Steam Packet Company.

Chart 2575, Eastern part of the Celébes sea.

Morong road lies three-quarters of a mile south-westward of the east point of the island. There is anchorage in from 17 to 25 fathoms, small stones, sand, and broken shells, about half a mile east-south-east of the village of Morong. Reefs extend from the shore on the north side of the anchorage.

Plan of anchorage, S.E. side of Salibabu, on 930.

Salibabu anchorage.—The bay and anchorage of Salibabu, situated on the south-east side fronting Kaburuan island, have irregular depths of from 5½ to 20 fathoms, rocky bottom, near the shore, and 20 to 40 fathoms, sand, about a mile off. There are many coral reefs in the bay, with deep water at their edges; and in the northern part of the bay or harbour, where there are breakers, they extend 4¼ cables from the shore. The best anchorage in the road is in a depth of from 15 to 30 fathoms, sand, about S.E. by E. of Salibabu village, and two-thirds of a mile from the northern shore. Approaching from the southward, a berth must be given to coral reefs that extend more than half a mile from the shore, about 1¼ miles south-eastward of the village of Salibabu.

There is an inner bay, the shores of which are bordered with reefs, leaving a contracted space in the centre about 1¼ cables wide, where small craft can anchor in from 6 to 13 fathoms. The villages of Salibabu and Datu are on the shores of this inner bay.

Plan of Seree bay on 2193.

Seree (Sereh) bay (*Lat. 3° 55′ N., Long. 126° 39′ E.*).—Temporary anchorage during north-easterly winds may be found in the eastern part of Seree (Sereh) bay on the west side of the island, about 6 cables east of Seree (Sereh) village, in a depth of from 15 to 20 fathoms, sand and stones, at a distance of one cable from the shore. Fresh water may be obtained from two streams running into Seree (Sereh) bay.

Chart 2575, Eastern part of the Celébes sea.

Kaburuan, the southernmost island, is low, but has two hills on it. Of these, the northern one is much less lofty, so that in approach-

General charts 2575, 943, 1263.

ing from south or south-west, the southern only is seen, which has the shape of a flat cone, and forms a good landmark.

A reef extends 2 cables from the north-west point of the island, and a narrow reef, steep-to, skirts the west and south-west sides. The village of Mengarang, on the west coast, has a good trade in copra, cacao, and other products. The village is malarious. Off Mengarang the water is deep, there being 23 fathoms at 1¼ cables from the shore and 14 fathoms close to the reef. There is better anchorage on the south-east side of the island, but the tidal streams are strong. Anchorage may be had on the north side of the island off the village of Kaburuan, but only with off-shore winds, close to the reef, in 25 fathoms, sand and stones, with the flagstaff bearing South.

The Dutch trading steamers call at Mengarang on the western side, but do not anchor.

Danger.—Northumberland rock (*Lat. 3° 40′ N., Long. 126° 51′ E.*) is charted 6 miles S. by E. ¾ E. from the south point of Kaburuan : in the middle of the breakers a small patch of sand appears above water, and the extent of the shoal is about 2 miles north-north-west and south-south-east. The captain of S.M.S. *Stosch* reported in 1883 that the bank extends further east and south than shown on the chart.

The KARKARALONG ISLANDS are six in number, besides four shoals, between lat. 4° 45′ N. and 4° 9′ N., and long. 125° 3′ E. and 125° 45′ E. : viz., Ariaga or de la Silla (Saddle) (Marore) island, Meares or Haycock islands (two), Anda (Matu Tuang), Armadores (Mamanuk), and Kabalusu. Except Armadores (Mamanuk), these islands are all inhabited.

Ariaga (Marore) is tolerably high, and appears at some distance from the eastward as two islands : a shoal extends some distance north-eastward from its eastern point. On the south-west side is a village which may be closely approached.

There is anchorage off the village in 18 fathoms, with the western point bearing N. 12° E. and the flagstaff on the beach N. 52° E. A reef projecting from the east point acts somewhat as a breakwater, but the sea is often rough.

Meares consists of two tolerably high islets, Kawio and Kamboling, which are connected by a coral reef that dries at low water. A reef projects about 3 cables from the north-west end of Kawio, the northernmost islet, which also dries at low water.

Plan of Kawio anchorage on 2193.

Anchorage.—On the west side of these islands fairly good anchorage may be obtained in a depth of from 10 to 20 fathoms, sand

Plan of Kawio anchorage in 2193. Var. 1° 50′ E.

and coral, distant one to 2 cables from the shore reef, abreast the opening between the two islands.

There is also anchorage south-eastward of Kawio, in about 30 fathoms, with the south-east point of that island bearing N. 64° W., and the north-east point of Kamboling N. 79° W.

There are strong overfalls about 2 miles West and S.S.W. of Kamboling.

Chart 2575, Eastern part of the Celébes sea.

Anda (Matu Tuang) is low, and has a conspicuous tree in the middle of the island, and some small houses at the western end; a reef extends about 2 miles from the south-west point of the island, and at about one mile south-east of the island the depth is 15 fathoms.

Armadores (Mamanuk) is also a low island, with a village on the south side. There is a fringing reef, but no detached dangers were seen. Anda (Matu Tuang) and Armadores (Mamanuk) islands are reported to be charted about 3 miles too far to the S.S.E.

Kabalusu (*Lat. 4° 15′ N., Long. 125° 19′ E.*), also named Haycock island, is the highest of the group.

A reef projects about 1½ cables from the north-west point. In front of the village on the west side the depth is 14 fathoms about one cable from the shore, increasing rapidly seawards; the narrow shore reef is steep-to. Vessels should not approach the island closely, as the tidal streams along the reef set towards the island. On the south side of Kabalusu there is anchorage in deep water, 45 fathoms, with the north-west point of the island bearing N. 15° W., the flagstaff N. 19° E., and the east point East.

Dangers.—Churruca shoal, about a mile long, and which breaks, was reported in 1881 by the *Churruca* as lying with Anda (Matu Tuang) island bearing South, and Ariaga (Marore) island bearing West. Between Churruca shoal and Anda (Matu Tuang) island strong eddies are said to exist.

Marie reef, which dries, was reported in 1884 by the German bark *Marie* to be composed of sand extending nearly one cable in an east and west direction, and showing the sea breaking heavily upon it; it lies with Anda (Matu Tuang) island bearing S.S.E. ½ E., distant 10 miles, and shoal water is charted as extending about 2 miles south-westward from it. It is possible that Churruca shoal is identical with Marie reef.

Iphigenia rocks lie 7¼ miles S. by E. ½ E. of Armadores (Mamanuk). The northern rock or islet is low; on its north-west side is a rock above water, and to the south-eastward is a rock standing high out of the water.

Huiberg, or Haycock bank, is shown on the chart 16 miles S. 69° W. of Kabalusu island.

General charts 2575, 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 2° E.

TALAUTSE or SANGI ISLANDS.—Under the name of Sangi islands the Dutch include Sangi and all the islands southward to Biaru. They are of volcanic formation, and through them we trace the great volcanic band from the Malay to the Philippine archipelago. Sangi itself, the principal island of the group, is under the residency of Menado in North Celébes, and is governed by the native Rajahs under the direction of an Assistant Resident, who is stationed at Taruna. There are a few Europeans and Chinese on the island.

Lipang island (*Lat. 3° 57′ N., Long. 125° 21′ E.*) is situated 14 miles N.N.W. ½ W. of the north point of Sangi island; a large but visible reef extends westward from the west and north-west sides. On the south side is a village, which may be closely approached.

There is anchorage on the western side of Lipang in 30 fathoms, with the north-west point of the island bearing N. 10° E. and the south-east point N. 86° E. Louisa bank lies 4 miles N.W. of Lipang island.

SANGI, the largest island of the group, is 24 miles long north-north-west and south-south-east, from 8 to 15 miles broad, and of moderate height in the southern part, but the northern part consists of high mountains; among them, a smoking volcano, Mount Abu, 6,100 feet high, with a flat cone-shaped top, situated at the north-west end, is the principal peak. A destructive eruption of Mount Abu took place in March, 1856. Another eruption of this volcano took place on June 7th, 1892, when great destruction was wrought on the island, and more than 2,000 lives were lost. Some of the houses at Taruna were crushed by the weight of ashes that fell upon them, but the greatest damage occurred on the eastern side of the island, and the cocoanut plantations were entirely destroyed. The population of the island is about 45,000, divided into three districts under the same number of Rajahs, but the villages of Tomako and Dago on the south coast are under the Rajah of Siau.

On the coasts of these islands malignant marsh fevers are often prevalent. Of late years steps have been taken to drain several of the swamps, whereby the state of health has been improved.

The greater part of the natives of the Sangi islands profess Christianity, the remainder being Mohammedans or heathen. In 1902 there were 150 Christian communities and six active missionaries, helped by native assistants.

The coast of Sangi is generally steep-to, small reefs extending off only in a few places. *See* views *a*, *b*, at page 28.

General charts 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 2° E.

On the western side of Sangi the two bays. Taruna and Manganitu afford anchorage; on the eastern side there is anchorage off Tabukan, in Petta bay, off Kulur, and in the Bay of Miulu; and on the south side at Dago and Ngalipaeng bays.

Plan of Taruna bay on 930.

West coast.—Taruna bay runs in about 1⅓ miles in an east-north-east direction, with a uniform width of about half a mile; it is surrounded by wooded hills about 800 feet high. The northern side is clean, as charted, except in the north-east corner,- but the south side is fringed by a narrow reef. The depth is over 50 fathoms at a quarter of a mile inside the entrance, shoaling gradually to the head of the bay. The town is on the north side of the bay, and had, in 1905, a population of 6,092, of whom five were Europeans. The trade is almost entirely in copra, but sago, banana, rice, maize, and cotton are produced, and the timber is said to be very good for building. It is said that loading is very slow, and coolies are difficult to obtain.

Light (*Lat. 3° 34′ N., Long. 125° 27′ E.*).—A *red fixed* light, visible 2 miles, is shown at the pier end on the arrival of ships.

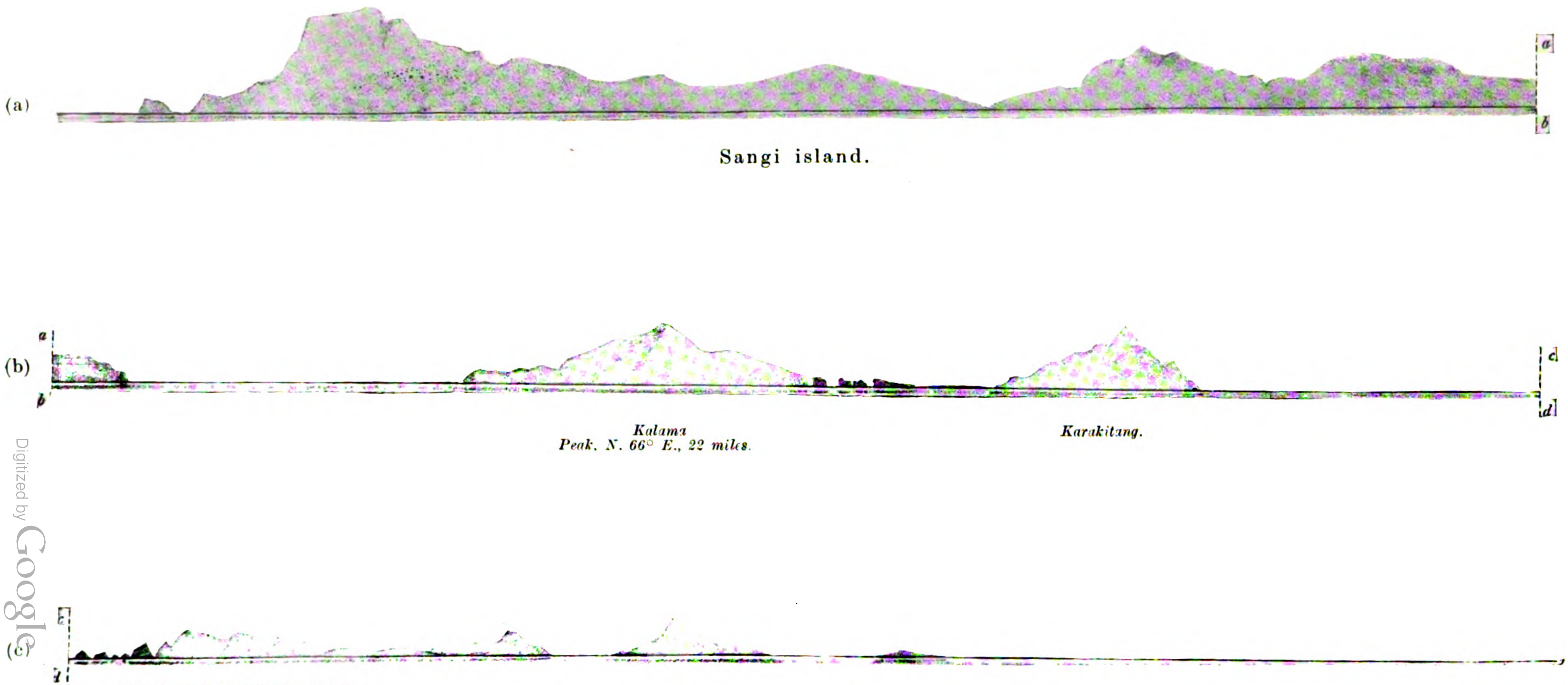
Anchorage.—The anchorage is in 20 to 30 fathoms and more, black sand, with the flagstaff of Taruna bearing from N.N.W. to N.W. by N.; about one-third of a mile farther up the bay the depth is 25 fathoms. As the bottom is steep and composed of loose sand the anchorage is not safe with continuous westerly winds, and a vessel lying with two anchors ahead on one occasion dragged and had to put to sea before a north-easterly squall. Even with easterly winds there is generally a swell in the bay.

Supplies.—Fresh fish can be had daily, but no vegetables, and fresh beef only now and then. The drinking water is bad, and moreover has to be fetched from a great distance.

Communication.—A branch steamer of the Royal Netherlands Steam Packet Company calls here once a fortnight from Menado and again on the return voyage a few days later.

Tides.—At Taruna the tide is mixed with a strongly preponderating double-daily character, which appears most clearly about 2½ days after the moon's declination is 0°, about 1st February, 1st May, 1st August, and 1st November: this character is nearly lost when, in the second half of June and December, the moon's quarters fall about one day after her greatest declination. The double-daily tide has springs nearly 2 days after full and change, with high water at 7h., and a range of 4½ feet: neaps occur at the same interval after the quarters, with high water at 1h., and a range of 1½ feet.

General charts 2575, 943, 1263.



Sangi island.

Kalama
Peak, N. 66° E., 22 miles.

Karakitang.

Islands southward of Karakitang.

Sangi island and Karakitang or Passage islands from the west-south-west (3 views).

Plan of Taruna bay on 930. Var. 2° E.

The single-daily tide has high water on the 1st January at about 6h. 30m. p.m.; 1st April at 0h. 30m. p.m.; 1st July at 6h. 30m. a.m.; and 1st October at 0h. 30m. a.m. It has springs about 2½ days after the moon's half-monthly greatest declination, with a range of fully one foot, and neaps at the same interval after the moon's declination is 0°, with no perceptible range. About the second half of June and December the spring range increases to over 3 feet, and that at neaps to 2 feet.

In the second half of March and September the spring range decreases to very little, and the neap range increases to 2 feet. The hours of high water are then, however, those of low water, and during the week preceding and following this period the single-daily movement of the water appears to be very irregular.

The high waters at springs of both regimes occur together, when, in the second half of June and December, full and change fall about one day after the moon's declination is greatest; the highest water levels are then reached at 7h. a.m. and 7h. p.m. respectively; the low levels differ little, relatively.

In the absence of more exact data the above remarks must be accepted with reserve.

Plan of Manganitu bay on 930.

Manganitu bay (*Lat. 3° 31′ N., Long. 125° 28′ E.*), about 1½ miles southward of Taruna bay, is also surrounded by hills, 800 feet high. It is 1½ miles wide between the entrance points, the available space, however, being considerably reduced by an extensive reef that borders the southern and eastern shores, and extends more than half a mile from Tanjong Liang on the south side of the entrance, in the direction of the northern entrance point. The reef on the north side is narrow. A detached reef lies 1½ cables north of the extremity of the reef northward of Tanjong Liang, with the north extreme of the islet at the head of the bay, bearing N. 71° E. A shoal, nearly a mile in extent, the position of which is doubtful, is charted as lying in the approach to Manganitu bay S.W. by W. 1½ miles from Tanjong Kalingangin, the northern entrance point.

The native town Manganitu is on a river near the head of the bay, before which there lies a bank with a little islet on it; landing is difficult.

The anchorage is in a depth of from 14 to 24 fathoms, with the flagstaff bearing E. ¼ N., and Tanjong Liang from S. 10° W. to S. 20° W. Good water is procurable.

Tides.—It is high water in Manganitu bay at 5 hours; springs rise about 6 feet. The tidal stream in the bay is weak and irregular.

General charts 2575, 943, 1263.

Plan of Manganitu bay on 930. Var. 2° E.

Along the coast the tidal streams are said to reach the rate of 2 miles an hour.

Plan of Tabukan road on 2193.

East coast. — Tabukan road (*Lat. 3° 40′ N., Long. 125° 35′ E.*), situated on the north-east coast of Sangi island, at about 8½ miles south-eastward from the north point, affords anchorage in a depth of about 12 to 16 fathoms with the flagstaff at Tabukan village bearing S.W. by W., distant 3½ cables. The depth increases very rapidly north-westward of this position, but gradually towards the shore southward, and also in the direction of a sand spit distant 2 cables south-eastward, which projects 2½ cables from the shore. The anchorage affords shelter during the south monsoon.

Plan of Petta anchorage on 2193.

Petta anchorage, 3 miles south of Tabukan, is half a mile in length and about 2 cables wide at the entrance between the coral reefs extending from either shore; the edges of the reefs are marked by two buoys, that on the starboard hand entering being white, conical, and the buoy on the port hand black, can. The depths decrease gradually from over 30 fathoms at the entrance to 7 and 8 fathoms at the head of the bay, where the village of Petta lies.

To enter, keep the beacon in the form of a cross, upon a hill, 370 feet high, behind the village of Petta, in line with a similar beacon on the shore, bearing S. 39° W.; the anchorage is about 2 cables within the buoys, in a depth of 18 fathoms, sand, and is well protected during the south monsoon.

Light.—A *red fixed* light, visible 2 miles, is shown on the arrival of ships.

Communication.—A steamer of the Royal Netherlands Steam Packet Company calls at Petta once a fortnight.

Plan of Kulur anchorage on 2193.

Kulur anchorage, about 4½ miles southward of Petta anchorage, is at the mouth of an indentation in the coast about 2 cables in width, and penetrating about half a mile to the south-west; the inner two-thirds of the bay is occupied by shoal ground. The depth is 21 fathoms midway between the entrance points, at the distance of about 1½ cables from the 5-fathoms contour line. Kulur village lies around the head of the bay.

Plan of Miulu anchorage on 2193.

Miulu anchorage, south-eastward of Kulur anchorage, is fronted by Tegang, Batu Wingko, and other islets, of the passages

Plan of Miulu anchorage on 2193. Var. 2° E.

between which there are no particulars. There appears to be anchorage off the northern part of the long straggling town of Miulu, in a depth of 18 fathoms, at about 3 cables from the shore, which is fringed with a sand flat to the distance of more than a cable.

Plan of Dago bay on 2193.

South coast.—Dago bay (*Lat. 3° 24′ N., Long. 125° 35′ E.*), on the south coast, is about 2 miles deep and half a mile wide. Its entrance is very deep, and appears to be clear of danger. Anchorage with shelter from nearly all winds may be obtained in about 27 fathoms half a mile from the village at the head of the bay, off which, however, a reef dries for nearly a quarter of a mile. The anchorage is sheltered from all winds. The western peak of Kalama island astern bearing S. 33° W. leads to it.

Plan of Ngalipaeng bay on 2193.

Ngalipaeng bay, about 4¼ miles eastward of Dago bay, is about 6½ cables wide at the entrance between Tanjong Kotohe on the west and Tanjong Dolohe, the western end of Lingies island, on the east, and extends about one mile north-north-westward, narrowing to 1½ cables at the head. Ngalipaeng village lies at the head of the bay. Anchorage may be obtained in about 40 fathoms, at 3½ cables southward of the village, sheltered from all but south-easterly winds.

Chart 2575, Eastern part of the Celébes sea.

Islets.—From 3 to 9 miles north-eastward of the northern part of Sangi is a group of islets named Nipa, Bukit, Poa, and Liang, respectively, and about 9 miles farther eastward is a chain of six islets and two detached reefs, which extend about 9 miles in a north-north-west and opposite direction. From Inis islet, the southernmost of this chain, a reef of rocks extends some distance southward, and it should be given a good berth. All the above islets are covered with cocoanut trees, but very little is known about them.

Off the south-east of Sangi are Tegang (the largest), Batu Wingko, Beng Durong, and Beng Laut islets. From the south-western part of Beng Durong a reef extends a considerable distance. One rock lies northward, and two east-north-eastward of Beng Laut. The channel between Beng Durong and Sangi is stated to be very much narrower than charted.

Several islets lie off the south coast of Sangi. Kima islet, lying 3 miles off the entrance to Dago bay, with three other islands between it and the shore, is clear and steep-to, with a deep channel to the northward. Palumbatu is separated from Sangi by a narrow channel only fit for boats; a reef extends from its south point. The westernmost islet, lying near the shore, is in the form of an arch, and has a reef extending a considerable distance from it.

Karakitang or **Passage islands,** consist of six or seven islands and several rocky islets, lying between the south end of Sangi and Siau, separating the channel into two branches. The northern branch or passage between Kalama and Kima off the south end of Sangi is 8 miles wide; about E. by N. 7 miles from Kalama, a depth of 65 fathoms was found, and high rollers were seen which were thought to indicate dangers. The southern channel, 10 miles wide, between Babundeke and Sangaluan islets and the northern point of Siau, is considered clear; but as the vicinity of these islands has not been examined, they should be approached with caution.

The three largest islands, Kalama (*Lat. 3° 15' N., Long. 125° 26' E.*), the northernmost, Karakitang, and Para, are inhabited; the natives only remain on the others temporarily. Taleko village lies at the north end of Para, at the head of a bay 5 cables deep and 2 cables wide; there is anchorage off the village in 40 fathoms, at 1¼ cables from the shore. Between Mahongetan island, situated 3½ miles west-south-west of Karakitang, and Banua Wuhu islet close westward of it, a submarine volcano is said to exist which sometimes throws up a column of water. Banua Wuhu is 100 feet high, and is composed of volcanic sand and pumice stone. Views *b*, *c*, at page 28.

Siau island has a remarkable range of volcanic cones, perfectly distinct from each other. The northern one, Gunong Api, is an active volcano, 5,930 feet high, but no great and destructive eruption has occurred for many years; the other three are lower, decreasing gradually to the lowest in the southern part of the island, where, to the south-east, the land appears much broken up. There are 26 villages 12 on the east and 14 on the west side; of these Ulu on the east and Undung on the west are the principal. *See* view *c*, at page 22.

The population of the island amounts to 24,000, and is increasing. The number of Christians is about 8,000, divided into 30 communities, each of which has its own small church. Instruction is provided by six Government and a number of mission schools. The natives are tall and the men lazy, most of the labour being performed by women.

The island is extensively cultivated, and has numerous nutmeg and cocoanut plantations.

Large quantities of copra are shipped to Singapore and Menado by the Chinese living at Ulu and Undung. The principal industry, besides cultivation and fishing, is the weaving of a native cloth called Koffo, which is made from the fibre of a species of banana tree. The state of health of the island is favourable; only skin diseases are common.

General charts 943, 1263.

Plan of Kampong Ulu anchorage on 2193. Var. 2° E.

Anchorages.—Kampong Ulu (*Lat. 2° 42′ N., Long. 125° 24′ E.*). —There is anchorage off Ulu village on the eastern side of the island, about 1¼ cables from the shore, in a depth of about 30 fathoms, with Gunong Api in line with a stone pillar near the shore, bearing N. 16° W.

Vessels anchoring close in, in about 15 fathoms, should have a hawser to the shore, as the bank is steep. From the beginning of January to the middle of April this anchorage is unsafe for sailing vessels, as the winds are then strong from north-east to east.

Ulu is a clean village, with a church and school. A good road leads to Sawan and thence across the island to Undung.

Light.—A *red fixed* light is shown from the pier end on the arrival of ships.

Plan of Sawan and Ulu roads on 2193.

There is also anchorage off Sawan, 2½ miles south-south-westward of Ulu, in a depth of 15 fathoms, sand and rock, with the market house bearing N. 82° W., and a small rock northward of Tanjong Timokolang S. 48° E.; this anchorage, more especially during the south-east monsoon, when the wind is mostly South, is better than that of Ulu. A broad reef juts out northward from Tanjong Timokolang, outside which is the small rock (about 15 feet high) just mentioned.

Supplies.—Though Siau is thickly populated, provisions such as pigs, poultry, eggs, cocoanuts, and bananas can only be procured with difficulty.

Communication.—A steamer of the Royal Netherlands Steam Packet Company calls at Ulu once a fortnight on the route from Menado to Sangi, and again on the return voyage, from 5 to 7 days later.

Chart 2575, Eastern part of the Celébes sea.

Pahepa and Mahoro islands, with smaller islets and rocks between them, extend eastward from Tanjong Timokolang, the south-east extreme of Siau island. A rock, with 3 feet of water on it, lies 7 cables from the south side of Mahoro, with the south point of the island bearing N. 42° E. Burias island, about a mile to the northward, has rocks rising above water at the distance of a cable from its northern shore. It is inhabited.

Makaleheh, situated 9 miles westward of Siau island, charted as 394 feet in height, is described as a densely-wooded flat island, highest on the eastern side. It has about 700 inhabitants, whose principal occupation is fishing. The island has a fresh-water lake in the centre, and is very narrow. *See* view *c*, at page 22.

General charts 2575, 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 2° E.

Tangulandang island is situated 15 miles southward of Siau, a safe, deep channel named the Siau passage, 14 miles wide, lying between. The island has two peaks, both round-backed, showing as one when seen from the south-east. The eastern and highest peak, 2,554 feet above the sea, is generally hidden by clouds during the south-east monsoon; the western peak, 2 miles to the west of the higher one, is 2,456 feet high and more abrupt. From these peaks the island gradually slopes to the westward, and forms Tanjong Toari, which is surrounded by a reef extending about 6 cables in all directions from it. Tangulandang, the principal village and trading establishment, is on the south side of Tanjong Toari. There is also a village, named Minanga, in a bay on the northern side of the island, said to be frequented during the north-west monsoon, when the western side is unapproachable. The southern and eastern sides are much steeper, and appear to have deep water off them. The village of Haas is on the east side of the island. The island has about 6,000 inhabitants, of whom more than 3,000 are Christians. The three villages already named have Government schools, and there are eight mission schools in smaller villages. Boat building is a considerable industry.

Plan of channel between Tangulandang and Ruang on 2193.

Between Tangulandang and Ruang islands there is a channel half a mile wide, through which the tide runs strongly.

A reef, with a depth of 6 feet, is situated nearly midway between Tanjong Pehee, Tangulandang island, and Tanjong Batu Waleby, Ruang island.

Light (*Lat. 2° 21′ N., Long. 125° 22′ E.*).—A *red fixed* light, visible 2 miles, is shown on the arrival of ships, from a pole near the flagstaff at Tangulandang village.

Anchorage.—There is anchorage in about 30 fathoms off the village of Tangulandang, with the flagstaff bearing N.E. by N. and Tanjong Toari N.N.W. ½ W., over 1½ cables from the shore. This anchorage is only suitable with good weather and a calm sea, and it is better to anchor under Ruang island.

Anchorage may be obtained in very fine weather off the village at the south end of the island, but the water is very deep.

Ruang island is formed by an active volcano, which rises in a cone to a height of 2,450 feet; three pinnacles rise from the edge of the crater showing as two only when seen from the westward. The last eruption took place in 1874. The shores of the island appear to be steep-to, except in the channel separating it from Tangulandang,

Chart 2575, Eastern part of the Celébes sea. Var. 2° E.

where a reef projects one cable on the east side, with a 6-feet patch at 2 cables, and on the west side of the island where a reef extends to the distance of 3 cables The eastern point is low, and there is generally a tide race off it. There is no water on the island, and it is only occasionally inhabited by fishing parties from Tangulandang.

Plan of channel between Tangulandang and Ruang on 2193.

Anchorage.—H.M.S. *Flying Fish* anchored while taking observations, in a depth of 22 fathoms, at three-quarters of a cable from the black sandy beach on the north-east point, but a slight swell setting in, her anchor slipped off the steep bank; vessels anchoring there should secure by a hawser to the shore. At about 1½ cables off, the depths are from 30 to 45 fathoms.

Chart 2575, Eastern part of the Celébes sea.

Pasigi island is about half a mile in diameter; it is flat, covered with trees about 100 feet high, and surrounded by a coral reef which extends a quarter of a mile from its southern shores from south-east to south-west, and 2½ miles to the north-east. There appeared to be an entrance through the reef on the north-east side; the channel between the Pasigi and Tangulandang reefs, about 9 cables wide, is clear and deep.

Biaru island (*Lat. 2° 6′ N., Long. 125° 22′ E.*), the southernmost of the Talautse or Sangi islands, lies 9 miles southward of Ruang island, separated from it by a safe channel, the Ruang passage. Biaru is 5½ miles long north-east and south-west, and 2½ miles wide; it is wooded and traversed throughout its length by a range of hills about 800 feet high, rising on the east side of the centre to a remarkable and precipitous hill with a thumb-like summit 1,240 feet above the sea. Off the south-west point is a small wooded islet about 200 feet high. The western coast is broken by bays with islets before them. A pillar rock, 30 feet high, stands off the north-west point, which is low, and should not be approached within 1½ miles, as a coral reef extends off here, which has not been surveyed and should be avoided. View *a*, at page 44.

The north-east point of the island consists of high cliffs with a pillar rock off it, and a reef extends half a mile north-north-east of it, which uncovers 3 feet at low water. The coast facing the south-east is cliffy and steep-to.

Plan of North bay on 2193.

Anchorage.—On the north side of Biaru there is a wide bay which affords anchorage in the south-east monsoon in a depth of 6 fathoms close to the reef, on the west side of the bay, with a small

Plan of North bay on 2193. Var. 2° E.

red-topped islet in line with the summit of Biaru, bearing S. 11° E., and the extremes of the bay N. 80° E. and S. 85° W. Care must be taken on approaching this anchorage as the water shoals suddenly, and the reef does not show when covered and when the water is smooth. About half a mile west of this anchorage is the entrance to a creek leading to a large village.

Plan of North part of Celébes island on 930.

NORTH-EAST COAST OF CELÉBES. — Banka island lies south-westward of Biaru island, from which it is separated by a safe and deep channel 17 miles wide, named Banka passage. The island is inhabited, is 6½ miles long north and south, and 4½ miles wide, of irregular shape and densely wooded, with the exception of several clear spaces of coarse grass. The summit is on the eastern side, 1,140 feet above the sea; to the west of it are several round-topped conical hills, ranging from 600 to 800 feet in height. The north point of the island is formed by low mangroves; a rock, 14 feet above water, named Batu Kapal, rises at 2 cables from the point, and is connected with it by a coral reef. Tanjong Batu Goso (*Lat. 1° 48′ N., Long. 125° 11′ E.*), the north-eastern point of the island is a sharp, conical hill 266 feet high, and joined to Banka by a low neck of land. To the north-east the point ends in a succession of sharp needle rocks, the outermost of which are surrounded by water, and are about 15 feet high. The south point of the island is a low cliffy point, rising to a conical hill 280 feet high, with an islet of similar shape to the north-east of it, from which a breaking reef extends more than half a mile south-eastward, with deep water close to it. There are heavy tide rips off the point, and a wide berth should be given it. The west coast of the island is low, and fringed by coral, extending about a cable from the shore.

The western point of the island is a low dark-red cliff with trees upon it; to the northward of it is a bay with soft muddy bottom, which is the only place here where landing can be effected. To enter it a boat should go ahead of the ship, as the entrance is intricate and narrow; a small stream enters at the head of the bay.

Kinabohutan island is low and wooded, with a kind of terrace about 60 feet high on its southern side. It is surrounded by a reef, half a cable wide and steep-to off the south and south-east points, extending to a third of a mile from the east shore; while on the north-west side, it nearly joins the reef of Talisse (Talisei) island, leaving only a narrow channel of 2 fathoms depth, too narrow and intricate to be used by ships. The channel between Kinabohutan and Banka islands is 3 miles long and one mile wide, and has depths of from

Plan of North part of Celébes island on 930. Var. 2° E.

8 to 22 fathoms in it; the tidal streams in this channel are sometimes very strong, but are not perceptible on the eastern shore.

Talisse (Talisei) is a high narrow island nearly 6 miles long with a central peak 1,175 feet high. It is thickly wooded, with patches of cleared land, and occupied, along with Kinabohutan, by the Molucca Trading Company (*Moluksche Handels Vennootschap*), who have laid out extensive plantations of cocoanuts; the copra from these islands fetches a high price. A species of iron-wood is also grown here, which will give straight piles 100 feet long, good for piers; but it is too heavy for spars or for ship's use, and will not float in sea water.

The north-east point of the island, Tanjong Aros, is a bold cliff with large broken rocks at its base, and steep-to; it is frequented by a number of sea-fowl, and edible birds' nests are found in the caves here. The tidal streams run with violence round the point, with tide rips and eddies. The north and west coasts are fringed by a coral reef which extends to a quarter of a mile from the shore in places, with deep water close to it. The south-west point, Tanjong Bung, is of sand and mangroves, with a great square rock off it, 10 feet above water; the reef off the point extends a quarter of a mile. The south-east point is a sand spit, with a reef off it which projects about 3 cables to the eastward. From the south-east point to the station, 1¾ miles to the north-east, the shore is low, covered by mangroves, and fringed by a reef one to 2 cables wide.

LIGHT (*Lat. 1° 53′ N., Long. 125° 6′ E.*).—A *white flashing* light *every five seconds*, elevated 354 feet above high water, and visible 25 miles in clear weather, is exhibited, from a white iron framework, 65 feet high, situated on Tanjong Aros, the northern extreme of Talisse island. For arc of visibility, *see* Light list and charts.

Plan of Talisse road on 930.

Talisse (Talisei) **road,** between the south-east point of Talisse island and Kinabohutan island, affords good anchorage in a depth of 10 to 12 fathoms, with the flagstaff bearing about N. 53° W. and the west tangent of Kinabohutan island N.E. between the shore and a bank with 8 fathoms least water. There is a stone mole with a shed at the end, but only very small vessels can lie alongside. The house of the manager of the Molucca Trading Company is near the mole; a flagstaff stands in front of it.

Shoals.—To the north-east of the mole the fringe reef extends gradually farther out, until at a quarter of a mile from the mole the depth at about 1½ cables from the shore is 1½ fathoms, steep-to; and at about 6 cables eastward from the mole there is a patch detached

Plan of North part of Celébes island on 930. Var. 2° E.

from the Kinabohutan reef with less than 6 feet on it, and with one spot awash, towards which the flood stream sets strongly. A reef, on which the depth is 4½ fathoms, lies S. 51° E. 3$\frac{6}{10}$ cables from the flagstaff.

Clearing mark.—Tanjong Puisan in line with the western extreme of Banka, S. 34° E., leads westward of the coral shoal west of Kinabohutan island.

Light (*Lat. 1° 50′ N., Long. 125° 4′ E.*).—A *red fixed* light, visible 2 miles, is shown from a pole at the end of the mole at Talisse on the arrival of ships.

Coal.—There is a small coal depôt of about 2,000 tons capacity at Talisse road for the supply of Government vessels.

Communication.—A vessel of the Royal Netherlands Steam Packet Company calls at Talisse every four weeks.

Tides.—It is high water in Talisse road, full and change, at 6h. 45m. (August); springs rise 7 feet, neaps 5½ feet. The flood stream sets to the northward between Talisse and Banka, and to the westward between Talisse and Tindila.

The tides on the east coast of Talisse are of a mixed character, the double-daily tides, or those occurring twice in 24 hours prevailing. The double-daily tide has springs about half a day before full and change, with high water at 6½ hours, and a range of 6 feet; neap tide occurs about half a day before the moon's quarters, with high water at 12½ hours, and a range of nearly 1½ feet.

The single-daily tide has high water on 1st January at about 4h. p.m.; on 1st April at about 10h. a.m.; on 1st July at about 4h. a.m.; and on 1st October at about 10h. p.m.; the spring tide occurs fully one day after the moon's greatest declination, with a range of 2 feet, and neap tides the same time after the moon's declination is 0°, with a range of 6 inches.

The high and low waters of the two descriptions of tides cannot fall together.

The highest spring tides occur about 1st December at 6h. 30m. p.m., and 1st June at 6h. 30m. a.m.; the lowest about 1st September at 0h. 30m. p.m., and 1st March at 0h. 30m. a.m. The tidal movement is weakest when the moon's declination, 0°, occurs about 1½ days before the moon's quarters.

Supplies.—No supplies are obtainable. Good water is obtained from a spring near the manager's house.

General charts 2575, 943, 942a, 1263.

Plan of North part of Celébes island on 930. Var. 2° E.

Tindila island is half a mile long north and south, and 2 cables wide; the northern part is rocky and moderately high; the southern part ends in a wide beach of white sand—the observation spot of H.M.S. *Flying Fish.* A reef and shoal water extend from it 5 cables to the westward. The channel between Tindila and Talisse is 4 cables wide, has a depth of 8 to 15 fathoms, and is clear of all danger, but the tidal streams are strong, with eddies and overfalls. The channel between Tindila and Ganga is only fit for boats.

Ganga island is about 1½ miles long north and south, and half a mile wide, rocky and wooded, with a hill about 330 feet high on the southern part. The eastern side is steep-to, but the southern and western sides are fringed by a reef, while the southern extreme is surrounded by a bank which slopes gently from 3 fathoms at 1½ cables from the shore to a depth of 10 fathoms, over half a mile off, and is marked by discoloured water. It is advisable to give a wide berth to this point, as the flood stream to the westward sets directly on to it, and then branches off to the northward and westward. Ganga is inhabited, Tindila and Lihaga are not.

Lihaga, a small wooded islet to the westward of Ganga, is 109 feet high, and fringed by a narrow reef steep-to on all sides. The channel between Lihaga and the nearest point of the Likupang shore is 1¾ miles wide.

Plan of Menado road on 930.

NORTH COAST of CELÉBES. — Menado bay (*Lat. 1° 30′ N., Long. 124° 50′ E.*) is about 7 miles wide between Tanjong Kalasei and Tanjong Pisok, to the north-east, and extends eastward 4 miles. The land to the northward of the bay is high, but terminates in a low mangrove point, Tanjong Pisok, bordered by a reef which is steep-to and projects nearly 4 cables to the westward; the reef continues as a narrower fringe along the whole shore of the bay. Off Tanjong Tokabene, 6 cables south of Menado fort, a shoal spit, on which is a ball beacon, projects to the distance of 3½ cables. The whole bay is steep-to, the depth decreasing suddenly in a distance of 6 cables from 150 fathoms to 60, 10, and one fathom.

The Menado river, which has its origin in the northern end of Tondano lake, discharges at the north end of the town. It is very shallow, but can be entered at high water by small craft drawing 5 feet; they can lie aground in safety. After heavy rains there is generally a very strong outset from the river.

Although the bay itself is spacious and free from danger, it only affords an insecure anchorage, fully exposed to westerly winds, which sometimes prevail with great force during the north-west monsoon, and last for some days, with heavy squalls, especially in the months of December, January, and February, bringing such a high sea and swell as to entirely interrupt communication with the shore. Steam vessels should be prepared to leave at short notice, and take shelter in Banka strait. A dark lead-coloured sky to seaward is an almost certain indication of the approach of these squalls. Therefore during the north-westerly monsoon, from November to April, any sailing vessel visiting this part of Celébes should proceed to Kema, on the eastern side of the peninsula, whence goods are conveyed overland to Menado.

During other months of the year, except in September and October, squalls will come very suddenly from both land and sea, but they are local, of short duration, and cause no swell.

During the south-east monsoon strong southerly winds, called *Selatan*, will sometimes blow for some days, without being overcome by the sea breeze.

LIGHT (*Lat. 1° 29′ N., Long. 124° 50′ E.*).—From an iron framework support, 39 feet high, situated on the beach to the southward of the mole, is exhibited, at an elevation of 42 feet above high water, a *white group occulting* light, showing groups of three eclipses *every thirty seconds*, thus: light, *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds*, visible 10 miles in clear weather.

Road.—The road is limited on the north by a W. by N. line from a beacon situated about 4 cables northward of the mouth of the river; on the south by a W. by N. line from the lighthouse, and extends 3½ cables from the shore.

Anchorage is prohibited southward of the lighthouse bearing E.S.E. At about three-quarters of a cable southward of the river entrance is a pier 158 yards in length and 10 feet wide, with an enlargement at the end; it is built in shallow water, and is suitable for boats.

Landing is often interfered with by the swell or by the stream out of the river, in which case the river should be entered or the boat run on to the beach. There is some wreckage about 150 yards southward from the pier and 100 yards from the shore.

Mooring buoys.—Seven mooring buoys have been placed in Menado road. The northern mooring buoys are heavier than the two southern sets.

The two southern sets, consisting of outer buoy and inner buoy, are intended for small craft and Government steamships. The northerly three buoys are laid out so that the sterns of vessels already anchored can be moored. The direction wherein the anchor must be let go will be indicated for each of the three buoys by two marks, which must be

Plan of Menado road on 930. Var. 2° E.

brought in line with each other, as follows:—northern buoy, two rectangular figures; second buoy, two discs; southern buoy, two equilateral triangles. In 1909 there was only one mark for the second buoy.

Directions.—When nearing the road, vessels lower an anchor down with 45 or 50 fathoms of chain, and approach one of the buoys very slowly with the landmarks in line until the anchor holds; the cable is then veered sufficiently and the vessel swung round on the anchor, and a stern hawser secured to the buoy.

Vessels finding all the northern buoys occupied should anchor northward of them as convenient.

Menado (*Lat. 1° 30′ N., Long. 124° 50′ E.*), the chief town of the Minahassa district, and the seat of the Residency, is of very pleasing appearance, and extends in two long tree-planted avenues parallel with the shore. The native villages are also models of order and neatness. The Chinese quarter is on the left bank of the river, northward of which the town continues; this part is inhabited by the poorest part of the inhabitants, mostly Mohammedans. Southward of the mole is an old stone fort, surrounded by a ditch, and garrisoned by 50 men. Good roads branch off in several directions towards the interior, with a succession of thriving plantations. To the west and south the country is mountainous, with some conspicuous volcanic peaks. The population in 1905 numbered 10,344, of whom 576 were Europeans and 2,784 Chinese. More than 6,000 natives are Christians; the rest are Mohammedans.

Communication.—The Royal Netherlands Steam Packet Company's steamers call here once a fortnight, both on the outward and homeward route between Surabaya, North Celébes, and the Moluccas. A branch vessel doing the service of the Celébes ports calls at Menado every four weeks.

Telegraph.—A cable is laid to Kwandang, N. coast of Celébes, whence there is communication with Java, *viâ* Borneo. Another cable is laid to Yap, whence there is communication with Shanghai, Honolulu, and San Francisco.

Climate.—The climate is healthy; infectious diseases are seldom known. The nights are cool, but with strong land winds it is necessary to be on one's guard. The land wind generally begins at about 4 p.m.

Rain falls in abundance during a good part of the year. The average yearly rainfall amounts to 105¾ inches. December, January, and February are the wettest months, and the driest are August, September, and October; *see* Appendix, page 324. In the dry season the climate is disagreeable.

General charts 930, 2575, 943, 942a, 1263.

Plan of Menado road on 930. Var. 2° E.

Trade.—The value of the imports in 1909 was £359,681, and of exports £540,618. The principal articles of import are earthenware and glass, flour, iron and steel, machinery, provisions, rice, yarn, &c. The chief articles of export are canes, coffee, copal, copra, dammar, ebony and other woods, mace, and nutmegs.

Supplies.—Provisions of all kinds can be obtained in very limited quantity and at a high price. Water can be obtained from the river, but boats must go well up the stream beyond the first fork to obtain it pure. It can be delivered alongside at 1·80 florins per ton. A water-conduit, from whence ships can supply themselves with washing water free of charge, is laid from a well in the vicinity to the extremity of the pier.

Tides.—It is high water, full and change, at Menado, at 6h.; springs rise 6 feet.

Plan of North part of Celébes island on 930.

Coast.—From Tanjong Pisok the coast trends north-east for 15½ miles to North cape at the western entrance of Banka strait, and is low and covered with mangroves to the water's edge. It is broken by several creeks in which there are fishing villages, and is bordered by a generally narrow reef; but abreast of the bight, situated 2½ miles south-westward of North cape, the reef, which almost completely fills it, extends about half a mile outside a line joining its enclosing points. Off the village of Kima, about 4½ miles from Tanjong Pisok, three shoals with 2, 2½, and 3 fathoms over them respectively, lie about one-third of a mile from the shore in a bight, otherwise there are no known off-lying dangers. Mount Tumpa, 2½ miles eastward of Tanjong Pisok, is 2,140 feet high. Behind the villages of Kima and Talawaan the country is low, but northward of Talawaan river it rises to a height of 1,330 feet, northward of which the coast is low, with hills behind it. Talawaan village lies at the mouth of the river of that name, about one mile north of Kima.

Anchorage (*Lat. 1° 36′ N., Long. 124° 52′ E.*).—There is anchorage in the bay in front of Kima village, within the three reefs mentioned above, in from 28 to 18 fathoms. The bay is sheltered by the islands lying off Tanjong Pisok and by the hills eastward of that point, and the water is always sufficiently smooth when landing at Menado is impracticable. The three reefs outside the bay are difficult to recognise by discoloration in the north-west monsoon. The passage between the two western reefs is nearly 2½ cables wide, with a least depth of 18 fathoms. The south point of Siladen island, bearing N. 74° W., leads to the passage, and there are two beacons on the shore northward of Kima. The rear beacon has a triangle, and the

Plan of North part of Celébes island on 930. Var. 2° E.

front beacon a diagonal cross, as topmark. With the beacons in line there is anchorage inside the reefs in 24 fathoms, or farther up the bay in 18 fathoms with a hawser to the shore near Kima. A beacon with ball topmark stands on the point of the dry shore reef that projects from the point near Wori village.

Plan of Kora Kora inlet on 2194.

Kora Kora inlet lies about one mile southward of North cape, and extends about 1½ miles south-south-eastward. The entrance is over 4 cables wide between the points, but reefs extend 2¼ cables from the western point and 1¼ cables from the eastern, leaving a deep channel only about three-quarters of a cable in width between them. There is good sheltered anchorage in about 20 fathoms, black volcanic sand, 2 cables from the western shore, with the western entrance point bearing N.W. by W. ½ W. and Mount Kalabat S. by E.

Ebony is occasionally shipped from the western entrance point.

Plan of North part of Celébes island on 930.

Islands south-west and west of North cape.—Menado Tua (*Lat. 1° 38′ N., Long. 124° 41′ E.*), lying 6¼ miles west-north-westward from Tanjong Pisok, is a very steep, well-wooded island, in the form of a truncated cone, and is apparently an old volcano. Its elevation above the sea is 2,695 feet; it is circular, about 2 miles in diameter, and surrounded by a steep-to fringing reef, 3 cables wide on the north-eastern side, but narrow elsewhere. There are few inhabitants, most of whom are in a village on the south-east side. On the slopes of the island are cocoanut plantations.

Bunaken island, 1¼ miles eastward of Menado Tua, is about 3 miles long east and west, three-quarters of a mile broad, and crescent-shaped, with a bay on the south side. The summit is on the western part, and is a round-topped hill 360 feet high, covered with brushwood. There are cocoanut plantations in several places. A coral reef, steep-to, surrounds the island and extends about 6 cables south of the south-western point, and 7 cables westward of the south-eastern point. There is a deep channel one mile wide between it and Menado Tua, and a similar channel 2 miles wide between the south-eastern point and Tanjong Pisok. The island has two villages, and is well populated; the principal village is near the south-east point.

Siladen island, lying 1⅓ miles north-eastward of the eastern part of Bunaken, is half a mile long north and south, and is separated from Bunaken by a deep channel over a mile wide. The island is low, surrounded by a steep-to reef from one to 2 cables wide, and has a white sand beach on its eastern side. It is nearly covered with cocoanut trees, and has a village on the west side.

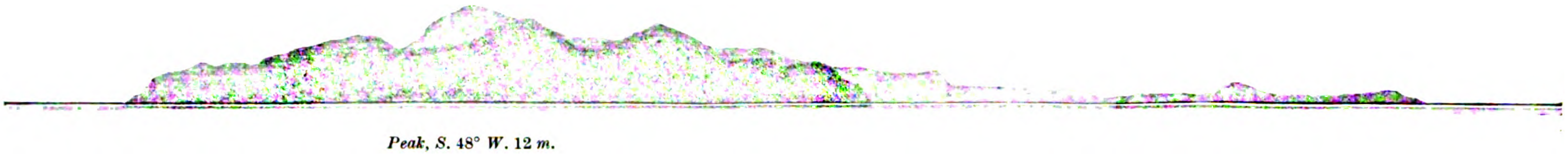
Manterawu, lying 4 miles northward of Bunaken, is over 4 miles in length north-west and south-east and 2½ miles wide. It is a flat coral island, covered with trees about 100 feet high, and surrounded by a reef which has depths of from 2 to 8 fathoms outside the edge in places, increasing rapidly to over 100 fathoms. The reef dries at low water, and is narrow in the south-eastern half of the island, but gradually increases in width until it extends over one mile northward of the north-west point; there are several houses on piles on the northern reef and some mangrove islets. The channel between Manterawu and the three islands to the southward is 3½ miles wide, deep and clear.

Nain island (*Lat. 1° 47′ N., Long. 124° 47′ E.*), lying 2¼ miles north-eastward of the north-east end of Manterawu island, and over 11 miles westward of North cape, is one mile long, north and south, and about half a mile wide; when seen from east or west it appears saddle-shaped, the northern summit being the highest, 630 feet above the sea. The island is surrounded by a coral reef which approaches within 4 cables of the shore on the north side, but extends 1⅓ miles from it on the eastern side, and 1¼ miles on the southern and western sides. The reef, which is very steep-to and marked by breakers and tide ripplings, encloses a lagoon containing several coral patches with deep water between them. The *Flying Fish* steamed round the reef, but could find no deep entrance. The island is cultivated, and on its eastern side is a considerable village, off which small vessels can anchor. On the eastern side, and within the lagoon, there is a wooded islet (Nain Kechil), 118 feet high. The channel between the reefs extending from Nain and Manterawu islands is three-quarters of a mile wide, deep and clear.

BANKA or LIKUPANG STRAIT, lying between the north coast of Celébes island and Banka and the other islands previously described on pages 36-39, is 12 miles long from North cape to Tanjong Puisan or Cape Coffin, and presents no difficulties; a straight course through from one entrance point to the other will pass north of Korrier rock (*see* page 46), which is the only danger for vessels under 20 feet draught, while vessels of greater draught may pass through in not less than 8 fathoms by following the directions given further on. The tidal streams set fairly through the channel at the rate of 2 to 3 knots at springs.

South side.—North cape, or Tanjong Papalempungan, is rocky and thickly wooded to the water's edge, the tops of the trees

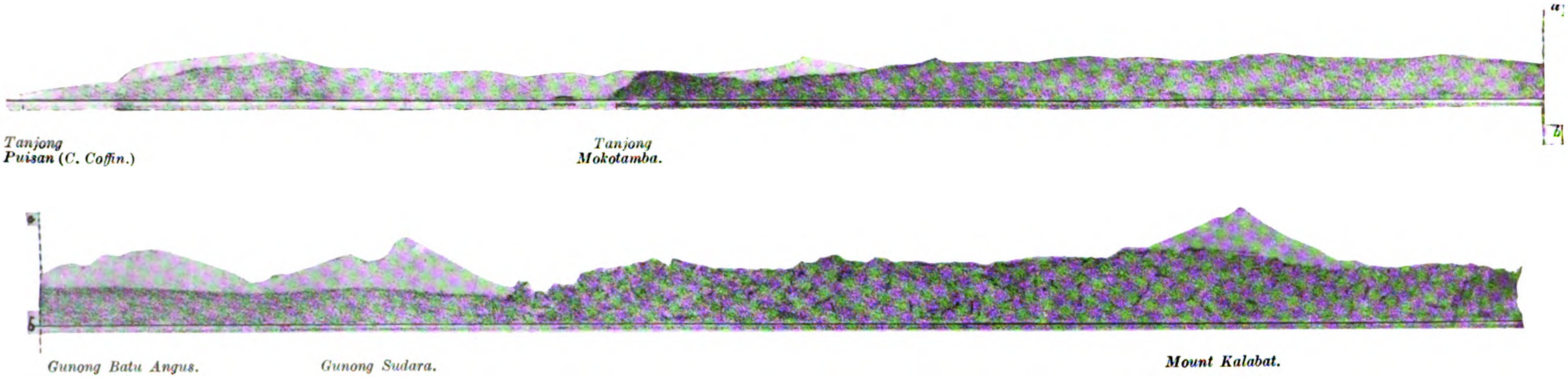
(a)


Peak, S. 48° W. 12 m.

Biaru island from the north-east.

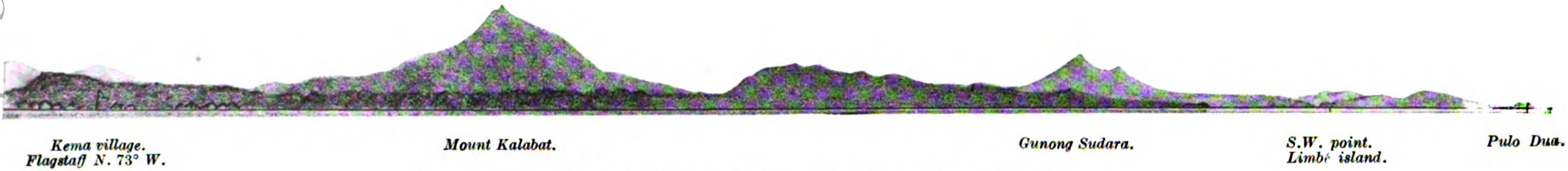
(b)

(c)



South side of Banka or Likupang strait (2 views).

(d)


Kema village.
Flagstaff N. 73° W.
Mount Kalabat.
Gunong Sudara.
S.W. point.
Limbé island.
Pulo Dua.

Kema and coast to the northward, from Kema anchorage.

Plan of North part of Celébes island on 930. Var. 2° E.

being about 100 feet above the sea. The land slopes gently upwards from the point to a hill 840 feet high, 1½ miles to the southward, which is the general height of the land at about the same distance from the shore all along the north coast. *See* views *b* and *c*, at page 44. The point is fringed by a coral reef little more than 40 yards wide and very steep-to, and on its eastern side there is a beach of white coral sand.

Tanjong Bohoi (*Lat. 1° 43′ N., Long. 125° 1′ E.*), situated about 3 miles east-south-east of North Cape, and opposite Ganga island, is a low rounded point with trees on it 100 feet high, similar to North cape, and fringed by a drying reef about 65 yards wide, on which the trees grow out beyond high-water mark. The 10-fathoms line is distant about 3½ cables from the point, and the water is often greenish-coloured there. At one mile westward of Tanjong Bohoi is the entrance to a circular bay, about 2 cables in diameter, with a depth of 8 fathoms in the middle, but the entrance is closed by a reef on which the depth is 9 feet. There are a few houses on the shore of the bay.

Plan of Likupang road on 930.

Likupang road.—From Tanjong Bohoi, the coast trends south-south-westward for 2¾ miles, and then takes an easterly direction for 8 miles, forming a bay, the western part of which contains two low islands, the largest of which is Pulo Tamperong, and several shoals, reefs, and drying sandbanks extending to a distance of about 1½ miles from the coast; the shore and islands are clothed with mangroves and fringed with coral. The road is well sheltered during the south-east monsoon, and free from the swell that is felt at Talisse anchorage in that season.

Likupang town, on the west side of the mouth of the river of the same name, is of small importance, and is in communication with Menado and Kema by a good road. The river is very shallow, and at low water boats cannot approach within 2 cables of the beach. The two points lying about one and 2 miles respectively, eastward of the river, are covered with trees to the edge of the water; the shore here is fringed by coral, and shelving. At 1½ miles east of this last point there is a pyramidal black rock, 18 feet high, connected at low water with a steep cliffy point about 300 feet high.

Anchorage.—The best anchorage is in a depth of 7 to 9 fathoms, sand, with the middle of Likupang village S.S.W. distant 1¼ miles, and Tanjong Bohoi bearing N.W. ¼ W.; small vessels can anchor closer in, but care must be taken not to shut in the 18-feet rock by the east point of the bay, as the ground inside is very foul.

General charts 2575, 943, 942a, 1263.

Plan of Likupang road on 930. Var. 2° E.

Supplies are scarce, and only to be had in small quantity; the water in the river is good.

Communication.—There is postal communication twice a week to Menado, overland.

Plan of North part of Celébes island on 930.

Tanjong Puisan (*Lat. 1° 41′ N., Long. 125° 10′ E.*) (Cape Coffin) is a bold point with large boulders off it, and a narrow fringe of coral which can be passed with safety at the distance of a quarter of a mile; there is generally a tide-race with eddies off the point, towards which the stream often sets strongly. From the cape, the land rises abruptly to a high tableland, 975 feet high, half a mile long and thickly wooded, easily distinguished from all sides by its square box-like aspect. Tanjong Mokotamba, 1½ miles westward of the north extremity of Tanjong Puisan, is steep and cliffy, about 200 feet high, and surrounded by huge boulders extending seaward about one cable; the depth is 3 fathoms at about 1½ cables from this point. View *b*, at page 44.

Shoals in Banka strait.—Korrier rock is of white coral sand, stones and shells, covered by 3 fathoms least water, and is generally indicated by tide ripplings; from it Likupang village bears S. 44° W. and Ganga summit N. 38° W. The shoal is steep-to on its east side, and shelves gradually to the northward and westward; on its west side are lumps of mushroom coral.

A shoal reported to have only 3¾ fathoms on it, but on which the *Flying Fish* found not less than 5½ fathoms, lies with Tanjong Puisan bearing S. 58° E. distant 4½ miles.

A bank 1¾ miles long north and south, and three-quarters of a mile wide at its north part, with a general depth of 7 to 9 fathoms, and a least depth of 5½ fathoms towards its southern end, lies with Tanjong Puisan bearing S. 51° E., distant 5½ miles from its shoalest part.

A shoal about 4 cables long north-north-east and south-south-west and 2 cables wide, with its least depth 4½ fathoms, as charted, lies with Tanjong Bohoi bearing N. 88° W. distant 3 miles. A patch of 5 fathoms lies about 4 cables westward of this shoal.

Not less than 5 fathoms was found recently on any of the above-mentioned shoals, with the exception of Korrier rock.

A 4-fathoms patch, charted 1¾ miles N. 13° E. of Likupang village, was not found on a recent survey, but it probably exists.

A shoal, 2 cables long and one cable wide, with 2¼ fathoms least depth, lies with Likupang village S. 6° E., distant 2¼ miles. This is the northernmost of the reefs west of Likupang road.

General charts 930, 2575, 943, 942a, 1263.

All these shoals are of light colour, and can be seen in clear weather at a distance of half a mile.

Tidal streams.—The flood stream runs westward fair through the strait between Tanjong Puisan and Banka island, at the rate of 2 to 3 knots at springs. It divides off the south point of Banka, and later to the south-east of Ganga island, part of the stream turning to the northward, running to the north-west through the passages between Ganga, Tindila, and Talisse, and principally to the north between Talisse and Banka; the remainder continuing to set west, turning to north-west and north after passing North cape. The flood stream on the west side of Talisse runs due north, and, meeting the stream from between Talisse and Banka, forms a tide-rip, which is met with 3 miles to the north-west of the north point of Talisse. The ebb stream runs between the islands to the south-east and fair through Banka strait. Tide-rips are formed off all the salient points, and there are heavy races to the northward and north-eastward of Banka.

DIRECTIONS for BANKA STRAIT.—From the Westward.—North cape may be passed at a distance of a quarter of a mile, and then a course S. 85° E., keeping the south end of Nain island just touching North cape, will lead clear of all dangers, with 8 fathoms least water, until the north-east end of Talisse and the west point of Banka are in line; a course may then be steered to pass a quarter of a mile from Tanjong Puisan.

If intending to anchor at Likupang, after passing North cape, a S.E. course should be steered, and North cape or Tanjong Bohoi should not be brought to the northward of N.W. by W. ½ W. until the eastern extreme of Talisse is in line with the western point of Kinabohutan, when a S.S.E. course will lead to the anchorage. The latter course, however, may lead close to or over the position of the 4-fathoms patch previously mentioned.

If intending to anchor at Talisse (*Lat. 1° 50′ N., Long. 125° 4′ E.*), the south point of Ganga island must be given a berth of three-quarters of a mile.

To make for Talisse anchorage by the passage between Talisse and Tindila from the north-west: Bring the square hill of Tanjong Puisan in the gap between Tindila and Ganga, and steer for it until the summit of Banka is in line with the hill 789 feet high (a round hill with trees on the top), bearing S. 88° E.; then steer for the summit of Banka on that bearing, opening the Banka summit to the northward of the hill on approaching the north point of Tindila; when Lihaga is seen between Tindila and Ganga the anchorage off the Talisse pier may be steered for. Or steer an East course midway

Plan of North part of Celébes island on 930. Var. 2° E.

between the reefs off Talisse and Tindila, which show well, and when Lihaga is seen between Tindila and Ganga proceed as above mentioned.

To pass through the channel between Banka and Kinabohutan from the northward, the west point of Banka island (a low red cliff) should be steered for, bearing South, until the flagstaff at Talisse is in line with the south extreme of Kinabohutan island; a S.W. by S. course then leads through the channel in the deepest water, over 10 fathoms. If intending to anchor at Talisse, continue on the course last mentioned until Talisse flagstaff bears W. by N. ¾ N., when the anchorage may be steered for.

From the Eastward.—From Tanjong Puisan, which may be passed at the distance of a quarter of a mile, steer for the gap between Ganga and Tindila islands till the north-eastern extreme of Talisse and the western point of Banka are in line, and do not open them till the south tangent of Nain island is just touching North cape, bearing N. 85° W.; then steer for North cape on that line, which will lead clear of all dangers. If intending to anchor at Likupang, Tanjong Mokotamba, the point next westward of Tanjong Puisan, may be passed at the distance of half a mile; the course should then be altered to the southward till the rocks off the point are in line with Tanjong Puisan, N. 85° E., and hence continued on these marks to the anchorage.

WEATHER.—In July, August, and September, in Banka strait, the general direction of the wind is between S.S.E. and South; force 2 to 3 during the day; light air and calms during the night; a few showers occurred, but there were no really wet days. There was one blow from the southward, force 4 to 6, which lasted 48 hours, and generally a squall out of Limbé strait. The weather was never very clear, except in the early morning, and the tops of the mountains were generally in the clouds. In the latter part of August, and in September, the weather became thicker, and during the latter part of September the land could seldom be seen more than a few miles. The average temperature was 82° Fahrenheit.

COAST.—From Tanjong Puisan (*Lat. 1° 41′N., Long. 125° 10′E.*) the general direction of the coast is S. by W. ½ W., for 5 miles to the head of a bay with a river in its southern angle, and terminated to the southward by cliffs 300 feet high, pierced by curious caverns. This reach of coast consists of long steep beaches of coarse black volcanic sand, the favourite resort of those singular birds, the Maleos, which in the dry seasons deposit their eggs in the sand just above high-water mark. The country behind is hilly and wooded.

General charts 2575, 943, 942a, 1263.

Plan of North part of Celébes island on 930. Var. 2° E.

Batu Bundita, lying close to the shore just southward of Tanjong Puisan, is a sharp-pointed rock with a white top 30 feet high.

Pulo Kalinaon, about 3 miles south-south-westward of Tanjong Puisan, is an islet 250 feet high, wooded, and joined to the mainland by a reef, which also extends nearly a quarter of a mile to the southward.

Pulo Mogogimbun is a small, wooded, conical island, 163 feet high, lying one mile E. by N. ½ N. from the perforated point. The south side of the island is steep and cliffy; a reef extends northward from its north side to the distance of about half a mile, with several rocks upon it, two of which show just above high water; it breaks heavily with the least sea or swell.

Anchorage.—There is good anchorage in the bay west of Pulo Mogogimbun, protected from swell and southerly winds, in a depth of about 20 fathoms, shoaling gradually to 3 fathoms close to the beach. The *Flying Fish* anchored with Pulo Mogogimbun bearing East and Batu Bundita N. by E. ¾ E.

Coast.—From the perforated cliffs above mentioned the coast trends in a south-easterly direction for 8 miles to the northern entrance of Limbé strait. The northern part of this stretch consists of a long black sand beach with native huts on it. The southern part is low, rocky, and thickly wooded, rising continuously at the back to the summit of the Sisters. Two pillar rocks, 40 feet high, stand off the northern entrance point to Limbé strait, and a reef extends half a mile to the northward and eastward, with several rocks on it that dry.

Anchorage.—During the survey, the *Flying Fish* anchored in a small bay half a mile to the north of Verbrande point, the north point of entrance to Limbé strait, in a depth of 17 fathoms, with Batu Kapal bearing N. 54° E., and the pillar rocks S. 26° E.

Volcanoes.—Mount Kalabat (*Lat. 1° 27′ N., Long. 125° 1′ E.*) is a very conspicuous cone standing by itself, rising to a height of 6,635 feet from a low base in the north-east extremity of Celébes island. Gunong Sudara, or the Two Sisters, a double peak about 8 miles E. by N. ¼ N. of Kalabat, is 4,480 feet high; the eastern peak is 590 feet lower than the western. Gunong Batu Angus, 10 miles N.E. by E. ½ E. of Kalabat, and 3,720 feet high, has a more rounded summit than Gunong Sudara; a crater has opened on the eastern slope of it at about 2 miles from the summit, and 1½ miles from the sea. This is a truncated cone of loose ashes, 1,445 feet high, of regular shape, whence a small lava stream has issued, forcing its way

General charts 2575, 943, 942a, 1263.

Plan of North part of Celébes island on 930. Var. 2° E.

through the forest to the sea. That it is of quite recent date is evident, for in 1907 the ashes and lava were devoid of all vegetation save a few patches of reeds. Views *c*, *d*, at page 44.

During the south-east monsoon these hills are generally clouded after 8 a.m. to a height of 3,400 feet above sea level, but it was noticed that Kalabat often remained clear while the mountains more eastward were covered.

LIMBÉ ISLAND is about 12 miles long north-east and south-west, and about 2½ miles wide in the southern part. It is covered with hills, which in the southern part reach a height of 1,545 feet, and are thickly wooded. The northern end of the island is very narrow and shows a range of hills about 600 to 700 feet in height, well wooded, precipitous, and steep-to on both sides. The northern point is covered with high trees and shrubs, and terminates in sharp pinnacles, with a detached rock 84 feet high (Batu Kapal), white from bird droppings; from this rock a line of detached rocks extends 2½ cables N. by E., over which the sea breaks; the outer rocks, about 6 feet high, always show above water.

The north-east point of the island is a wedge-shaped cliff about 200 feet high, similar to the north point. This point and Batu Kapal may be rounded in safety at the distance of half a mile. There is always a strong tide-race off the point.

The eastern side is high, cliffy, and steep-to. The south coast is bordered by a reef which is widest at its western part, and extends 6 cables south-westward of the south point of the island. The south point is formed by a narrow, hilly tongue of land.

The island is uninhabited, and is said by the people on the coast opposite to have numerous wild pigs and snakes on it.

Susulina islet, lying close off the south-east point of Limbé island, is about 120 feet high. Pulo Dua (*Lat. 1° 24′ N., Long. 125° 12′ E.*) lies about midway along the south coast, and half a mile off-shore; it is small, 310 feet high, and has two peaks. The east side is steep-to, but a reef extends from the north and west sides.

Sandy island, encircled by reef, lies about 7 cables westward of the south point of Limbé island at the entrance to the strait; on the west and north sides the reef is very narrow, but on the east and south sides it extends from one to 1½ cables; there is a detached rock, about half a cable in extent and covered by 2½ fathoms water, lying N. by W., distant 3 cables from its north point. There were two trees on Sandy island in 1907.

General charts 2575, 943, 942a, 1263.

Plan of Narrows, Limbé strait, on 930.

Limbé strait (*Lat. 1° 28′ N., Long. 125° 14′ E.*) is narrow and somewhat intricate; it is about 12 miles long, and in the middle there are two islets encircled by reefs with a channel on either side. The channel west and north of the islets is the best, being straight, and the reefs generally plainly visible. Coming from the northward, open the whole passage and steer through in mid-channel; outside the southern entrance of these narrows is a patch of 4½ fathoms, which is avoided by steering more southward when abreast of a rock above water on the Celébes side of the channel; after this keep in mid-channel.

Tidal streams.—The flood stream sets northward through the strait and the ebb southward, at the rate of 3 to 4 knots at springs in the narrowest part, but southward of the narrows on the Limbé side there is little stream. Springs rise 5 feet.

Anchorage.—Southward of the islands in Limbé strait there is good anchorage in 17 to 20 fathoms, and shelter from all winds and sea.

Coast.—In the southern approach to the strait, which is 2½ miles wide, a spit of 1½ fathoms, sand and mud, extends 3 cables off-shore at Girian village, situated 5 miles north-eastward of Kema fort, west side of the approach to the strait; a reef, steep-to, extends about 6½ cables off-shore between the spit and to within 1½ miles of Kema; the least depth found on it was one fathom.

Plan of Kema road on 2194.

KEMA, which is situated about 5 miles from the entrance of Limbé strait, forms a useful complementary port to Menado, according to the prevalent monsoon; in the north-west monsoon, chiefly in the months of December, January, and February, when Menado road is unsafe, vessels lie at Kema perfectly sheltered. A good carriage road connects the two ports, but the cost of transporting goods is high.

The best landing is at the southern part of the road, where there is some shelter from the swell that breaks heavily on the beach when the sea breeze sets in. Near Kema a small river discharges, the entrance of which is dry at low water. View *d*, at page 44.

Anchorage.—There is anchorage in a depth of 6 fathoms, fair holding ground, about 3 cables from the shore, with Mount Kalabat bearing N.W. by N., and the gap between the two peaks of Gunong Sudara N.N.E. ½ E. Anchorage may also be had further out in 10 to 12 fathoms. When approaching the anchorage from the southward the reef, partially dry at low water, extending 1¾ cables south-eastward from the south point of the bay, must be avoided.

General charts 930, 2575, 943, 942a, 1263.

Plan of Kema road on 2194. Var. 2° E.

On the north side of the road, and outside the 10-fathoms line at a distance of 2½ cables from the shore, is a detached rock with 3 fathoms over it, from which the Kema river entrance bears S. 74° W., distant one mile.

Supplies (*Lat. 1° 22′ N., Long. 125° 5′ E.*).—Provisions can be had in small quantities, and of good quality. The water from the river is brackish.

Communication.—During the north-west monsoon vessels of the Royal Netherlands Steam Packet Company only call when they have passengers on board for Menado.

Tides.—The tides at Kema are mixed, with a preponderating double-daily character. This character is most pronounced when, about the end of February, May, August, and November the full or change of the moon occurs about one day before its declination is 0°. When the maximum moon's declination occurs about one day after the quarter, the tide has a single-daily character, most pronounced in the second half of June and December.

The double-daily tide has springs more than one day after full and change, with high water at 6½h., and a range of 3½ feet; neap tides occur at the same interval after the quarters, with high water at the same hour, and a range of 6 inches. About the second half of March and September the range of both springs and neaps is 6 inches greater; in the second half of June and December the range at springs is 6 inches less, while that at neaps is imperceptible.

The single-daily tide has high water on 1st January at about 4½h. p.m.; 1st April, 10½h. a.m.; 1st July, 4½h. a.m.; and 1st October, 10½h. p.m. It is springs at about the moon's half-monthly greatest declination, with a range of 2 feet, and neaps about 7 days after springs, when the moon's declination is 0°, with a range of 6 inches. About the second half of June and December the ranges are one foot greater, and about the second half of March and September the spring range is one foot less.

The high waters of both double and single-daily tides occur together when, about 1st June and 1st December, the half-monthly greatest declination of the moon falls more than one day after the full or change; the highest rise is then at 6½h. a.m. and p.m. The low waters of springs do not occur together. The lowest water under the above circumstances is reached in the first half of March and September, shortly after midnight and midday respectively. When the moon's declination is 0° at about one day after the quarters, the tidal movements are very weak for a few days.

General charts 2575, 943, 942a, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 2° E.

Current.—Between Limbé and Tifori (*Lat. 1° 1′ N., Long. 126° 9′ E.*) islands, during the south-east monsoon the current was always found setting to the northward at the rate of from one to 2 miles an hour. In the north-west monsoon the current is said to be eastward on the Celébes shore, and northward along the east side of Limbé island; this being reversed during the other monsoon.

General charts 943, 942a, 1263.

CHAPTER III.

MOLUCCA AND GILLOLO PASSAGES TO BANDA ISLES.

VARIATION IN 1911.—Increasing about 1½ minutes annually.

Chart 2575, Eastern part of the Celébes sea. Var. 2° 10′ E.

The MOLUCCA PASSAGE, included between the north-east coast of Celébes and Gillolo island, is the most direct, and is the regular steam passage between the Celébes and Arafura seas. It is sometimes used by sailing vessels homeward bound from China, and after September with advantage, but it is a tedious passage to beat through, as the currents set with the wind at the rate of from 16 to 24 miles a day.

When it is difficult to get to the southward in the Molucca channel, dull sailing vessels might try to do so by keeping near the west coast of Gillolo and passing through Patientie strait, between Gillolo and Bachian islands. Vessels working to the northward would find it better to keep under the coast of Celébes.

Mayo island (*Lat. 1° 19′ N., Long. 126° 21′ E.*) is about 4 miles long, north and south, and rises gradually from the shore to a round-backed summit, 1,245 feet high. It lies in the middle of the Molucca passage, between Limbé island and Gillolo. It is well wooded, with several valleys, but is not inhabited. There is said to be anchorage on both the north and south sides of the island sheltered from the monsoons.

Tifori island, lying 20 miles south-west from Mayo island, is 2 miles long in a south-east and north-west direction, and one mile broad. On its north-west end is a saddle peak 522 feet high. About one cable's length off the north side of the island is a small islet connected with the mainland by a reef enclosing a lagoon with an islet in it, on which observations for position were made by H.M.S. *Flying Fish* in 1885. Temporary anchorage was found in 22 fathoms on the edge of the reef, with the summit of Tifori bearing S.S.W. ¼ W., and the peak of North island, East. The tide setting from point to point swung the ship in all directions, but not violently. On the eastern side of the island there is a bay in which proas frequently take refuge; in it there are depths of from 12 to 15 fathoms, but

Chart 2575, Eastern part of the Celébes sea. Var. 2° 10′ E.

access by large vessels is prevented by a ridge of coral across its entrance, upon which there is from 5 feet to 2 fathoms.

Between Mayo and Tifori islands there are no dangers.

Current.—During the southerly monsoon the current sets to the north, running stronger westward of the islands than to the eastward of them. During the northerly monsoon the current sets about S. by E. at the rate of 1¼ knots an hour, eastward of the islands, and is stronger there than it is to the westward of them.

Chart 2575, 943, 942a.

GILLOLO ISLAND, or Halmaheira.—This island is called by the natives Halmaheira (said to signify in the native dialect, mainland), Gillolo being the name of that portion of it with the inhabitants of which the Dutch first had intercourse. The interior is peopled principally by tribes of a Papuan type, but the Malays have made numerous settlements on the coast. The north and south parts of the island acknowledge the authority of the Sultan of Ternate, and the middle part and the eastern peninsulas that of the Sultan of Tidore. These chiefs are Malays, and the Dutch claim jurisdiction over both.

This island, though the least important, is by far the largest of the Moluccas, and in general outline is very similar to Celébes, consisting, like it, of four long and narrow limbs, with deep intervening gulfs. It lies to the extreme north of the whole group of islands, and has a length of about 190 miles from north to south; its width across the centre is about 40 miles, beyond which the two central arms project another 50 miles to the north-east and south-east.

The northern peninsula is mainly filled up by two lofty mountain ranges, between which lies an extensive, undulating plain, well cultivated with rice, and extending almost from coast to coast. This plain, which is the most populous part of Gillolo, is known by the name of Galela, from a town on the east coast. The river Taliabu, which flows from the south through the plain, enters Galela bay on the eastern side. The chain of mountains on the western side is of volcanic character, but only one of them is active, namely, Gam Kenora (*Lat. 1° 25′ N., Long. 127° 30′ E.*), which attains a height of 4,922 feet, with its crater on the southern side and a sulphur lake on the summit. View *c*, at page 58.

The other three peninsulas are intersected through their length by mountain chains, with some summits from 3,000 to 4,000 feet in height; spurs from these extend to the coast.

The inhabitants of Gillolo are about 30,000 in number, but the language spoken in the various districts is very different. The people support themselves by agriculture, hunting and fishing; rice, sago, cocoanuts, mother of pearl, trepang, and dammar gum are the prin-

General charts 942a, 2759a, 1263.

cipal products. The pearl-fishing banks are in Kayu bay, on the eastern side of the island, but the yield is not great.

Chart 943, Philippine islands.

WEST COAST of GILLOLO.—From Tanjong Bissoa, the north-west extreme of the island, the coast trends in a south-west direction for about 17 miles, to Tibur point, and is rocky and steep, with perpendicular cliffs in some places formed by the spurs from the coast range. It is steep-to, with occasional sand-beaches; one of these is at Ngacham, one of the largest villages in this part, which carries on a brisk traffic with the neighbouring islands. A small stream discharges near Ngacham. Tanjong Bissoa has a fringing reef around it, and may be passed at a distance of one mile.

Chart 2575, Eastern part of Celébes sea.

North Loloda islands, lying westward of Tanjong Bissoa, are moderately high and consist of four large islands, Tuakara, Duitaai, Guwaai and Salengading, besides a number of small islets. The northernmost islet is Tierah. Reefs surround Salengading, but the passage between it and Guwaai may be used by keeping towards the latter island. The passage between Salengading and Gillolo is safe, and about 2½ miles wide. View *a*, at page 58.

The North Loloda islands are occasionally visited by a vessel of the Royal Netherlands Steam Packet Company.

Anchorages.—There is anchorage in very deep water, 39 fathoms, off Tuakara, with the south point of the island bearing S. 88° W., and the northern point of land N. 24° E.

On the east side of Duitaai there is a small bay with a village, off which there is anchorage in 35 fathoms, with the north point of the bay bearing N. 84° E., and the south point S. 43° W. When entering, keep towards the shore on the starboard side, as a very long steep-to reef projects from the point on the port side.

On the east side of Guwaai there is anchorage in 17 fathoms, with the south point of the island bearing S. 53° W., and the west point of Salengading S. 8° W. There is also anchorage southward of Salengading, in from 15 to 20 fathoms, with a sandy spot bearing N. 3° E.

There is anchorage close to the Gillolo coast, opposite Salengading and near Dorume, in 18 fathoms.

Ditti island (*Lat. 1° 59′ N., Long. 127° 40′ E.*) is a thickly wooded coral island lying about 1¾ miles south-westward of Tibur point. Eastward of the island the coast forms a small bight, where there is safe anchorage. South-eastward of Ditti, in mid-channel, the depth is about 20 fathoms. The western side of the island should not

Chart 2575, Eastern part of the Celébes sea. Var. 2° 10′ E.

be closely approached, as much discoloured water was seen, and it should be given a berth of 2 miles in passing.

Bartoko bay, 7 miles south-westward of Ditti island, is said to afford good sheltered anchorage for large vessels, but there is no information concerning the depth of water. It is protected on the south by a long chain of rocks.

Coast.—From Bartoko bay the coast trends south-south-westward for 13 miles to the northern entrance to Loloda bay, and has a wild and inhospitable aspect; it is fronted by rocks above and below water, some of which are about a mile from the shore, and it should be given a good berth by large vessels. Native craft can approach the coast at Tosomolo and Bakun, and they find a safe lying-place in a bay immediately to the north of Hao bay. At Bakun there is a road across the island to the east coast.

Plan of Loloda bay on 2772.

Loloda bay (*Lat. 1° 40′ N., Long. 127° 32′ E.*) is formed by the South Loloda islands and the mainland of Gillolo. The three islands fronting the bay, Kahatollolamo, the largest and most north-westerly, Adui, and Rong, are high and rocky. Kahatollolamo has two large rocks on the north-west point, and a steep-to pointed rock, named Procho, close off the north-east point. The bay itself has numerous rocks, and a mud bank, partly dry at low water, extends off the coast of Gillolo for a distance of a mile in many places.

The northern entrance is between Kahatollolamo and Dua Setan, a small island covered with cocoanut trees and connected to the mainland by a reef. This entrance is half a mile wide between the reef which extends a quarter of a mile westward of Dua Setan, and the coast of Kahatollolamo, which is steep-to, the depths exceeding 20 fathoms.

The western entrance between Kahatollolamo and Adui is 3½ cables wide, deep, and clear of danger.

The south entrance, between Adui and Rong, has a deep channel, but having numerous rocks and reefs in it, is not recommended.

The best anchorage is in 8 fathoms, mud, about a mile from the shore to the westward of the mouth of the Loloda river.

In entering by either the northern or western channels the Kahatollolamo side should be kept, but no marks can be given for approaching the anchorage; the plan must be the only guide.

The thriving village of Loloda lies a short distance up the river, which is navigable by boats of not more than 2 feet draught. The river water is salt.

General charts 2575, 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 2° 10′ E.

Lang point (*Lat. 1° 33′ N., Long. 127° 28′ E.*), lying 6½ miles southward of the western entrance to Loloda bay, is high, and projects some distance westward. The coast between is broken, and 100 feet high in places. At the mouth of a stream in a bight with a narrow sand-beach, is the village of Tollofua, the chief place of the district of that name.

Ibu river discharges southward of Lang point. In 1894 the entrance was closed by the action of heavy rollers, but the river forced another outlet a short distance northward. The entrance is narrow, but widens inside, and continues shallow. There are several villages on the cultivated banks, which can be reached by large native craft. A sandbank lies in front of the river entrance, and the depths decrease from 12 to 5 fathoms gradually towards it. Outside 12 fathoms the bottom is steep.

In the north-west monsoon, owing to the breakers in front of the river, there is no good landing-place for boats, but a place sheltered from the westerly swell may be found northward of the river near a stream, where the sand-beach ends and the rocks begin.

About 4½ miles inland from the river entrance is Mount Ibu, 4,528 feet high, with a rounded summit. View *b*, at page 58.

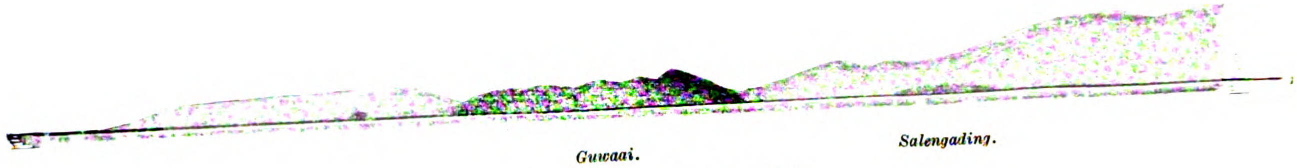
Anchorage off the mouth of the Ibu river may be had in 7 fathoms, half a mile from the shore, with Lang point bearing N. 19° W., and a village N. 58° E. It is open to westerly winds, and in the north-west monsoon a vessel should not go closer in, as the swell gets up very suddenly. In the south-east monsoon a berth may be taken from one to 1½ cables farther in, in 5 fathoms. Northward of the anchorage the bottom is stony, but sandy to the southward.

Coast.—From Lang point the coast trends south-south-west for 19 miles to Todahee bay, and has several points with small bights between them inhabited occasionally by fishermen, but there is no anchorage. From Lang point to the point under Mount Gam Kenora there is a beach of black sand, with a densely-wooded plain behind it, on which, at about midway between the points, is an isolated conical hill. Between the hill and the latter point a sandbank extends from the coast, and there are two villages northward of the point; southward of the point the coast consists of rock.

Mount Onu, 2,855 feet high, 5 miles south-westward of Mount Gam Kenora, lies about 2 miles back from this part of the coast, and appears split.

Todahee bay, at the western foot of Mount Duon, 4,134 feet high, is of oval shape, with a narrow entrance. Small native craft lie safely here, as the sea and swell do not penetrate, and it is the

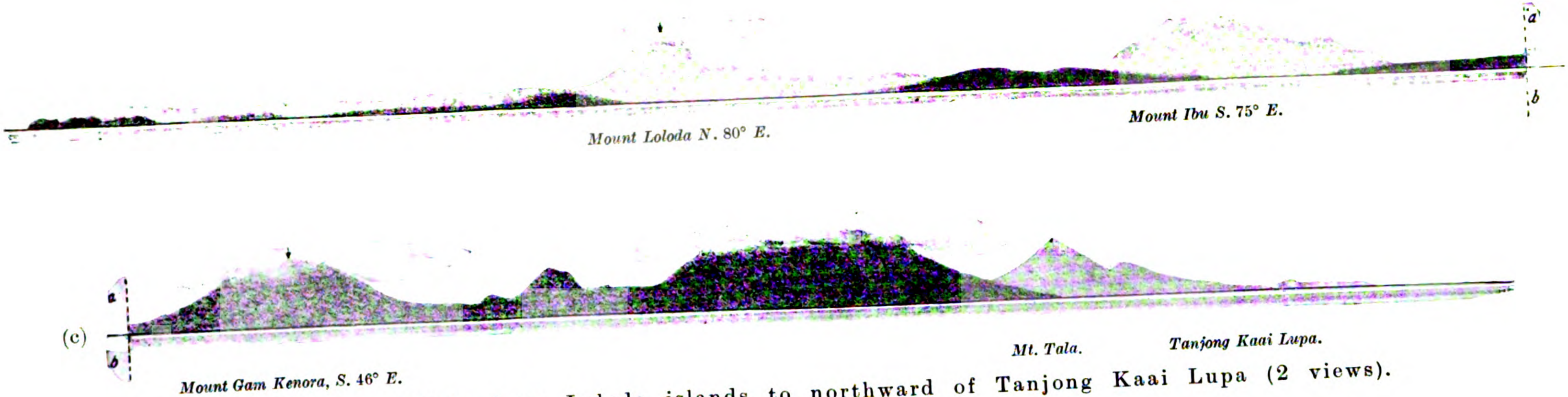
(a)



North Loloda islands.

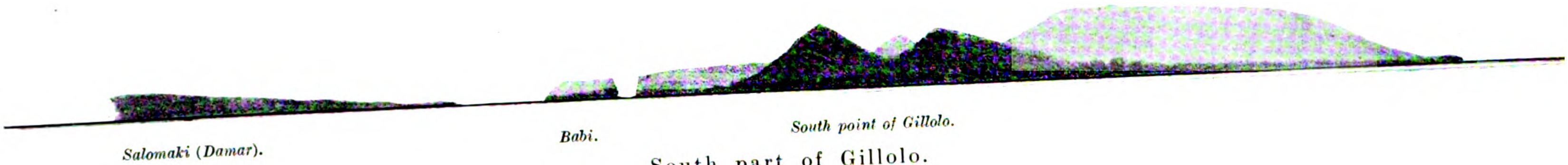
(b)

(c)


a
b
Mount Loloda N. 80° E.
Mount Ibu S. 75° E.
a
b
Mount Gam Kenora, S. 46° E.
Mt. Tala.
Tanjong Kaai Lupa.

West coast of Gillolo from Loloda islands to northward of Tanjong Kaai Lupa (2 views).

(d)



South part of Gillolo.

Chart 2575, Eastern part of the Celébes sea. Var. 2° 20′ E.

only good lying-place for them between the Ibu river and Sidangoli during the north-west monsoon. The bay is not recognised until within a short distance of it.

Sahu bay, 3 miles southward of Todahee bay, has a steep beach, on which stands the village of Susupu. There is no anchorage except close to the shore, and it is always unsafe. There is a depth of 8 fathoms where a vessel has anchored, at a cable's length outside the 3-fathoms line off the village, with the flagstaff bearing N.E. and the summit of Hieri island nearly in line with the south point of the bay. Native boats find shelter in the mouth of the river, with a sandbank in front of it, southward of the village.

Sallo island, near the shore northward of Tanjong Kaai Lupa, is rocky and surrounded by a reef; the passage between it and the shore is only available for boats.

The coast northward of Tanjong Kaai Lupa is steep; view *c*, at page 58; between Sallo island and the point is a cove with a shoal entrance, which affords shelter for native craft; there is a small village surrounded by cocoanut trees just westward of the point.

Jailollo bay lies between Tanjong Kaai Lupa and Tanjong Guwaai, a point about 5 miles south-eastward, and is deep. Its shores consist of steep cliffs and beaches with cocoanut trees in places; there are several villages. At the west side of the bay is Pajo hill, 984 feet high, a spur of Mount Tala, which is 3,642 feet high, and covered with bush and light-coloured reeds. At the foot of Pajo hill is Pajo bay, in which is good anchorage for small vessels, but the channel over the bank is difficult at low water, and not easily found. At the foot of Pajo hill are the Mohammedan villages of Kaai Lupa and Guawe. Off Tanjong Guwaai at the south-east side of the bay is the coral islet, Pulo Babua, surrounded by a reef.

Plan of Jailollo road on 2772.

The village of Jailollo (*Lat. 1° 6′ N., Long. 127° 27′ E.*) lies on the north shore of the bay, hidden by the mangroves at the mouth of the Jailollo river. The entrance to Jailollo road is 4½ cables wide, between the reefs on either side, whence it extends about a quarter of a mile northward to the edge of the reef which extends a similar distance from the shore. A Posthouder is stationed at Jailollo.

Anchorage, in about 20 fathoms, sand, may be had about 2 cables distance from the islets on the western side, and 3½ cables S.S.E. ½ E. from the river's mouth, with Pulo Babua bearing S. 7° W.

General charts 2575, 942a, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 2° 20′ E.

Tofiri island, 7½ miles S.E. by S. from Tanjong Kaai Lupa and nearly 3 miles off-shore, is small and surrounded by a reef. In 1872 there was a single tree on it. Depths of 13 fathoms lie one cable northward and eastward, and elsewhere at 2 cables distance the water is very deep. No discoloured water was seen between the islands and the shore.

On the Gillolo shore, north-east of the island, is a village; the beach here has many rocks on it, but southward of the village the beach is quite flat.

Tanjong Sidangoli, situated about 12 miles S. 30° E., of Tanjong Kaai Lupa, is the northern limit of Dodinga bay. A village with about 700 inhabitants lies near the point. Along the beach northward and southward are about a hundred houses, the establishment of the Sultan of Ternate, who sometimes visits the place for sport. A short distance inland is the Christian village of Sidangoli.

Southward and eastward of the point a number of islands and reefs extend off the coast to a distance of about 3 miles. The islands are covered with mangroves, and many are only dry at low water; only one has a small beach. Manomadehe and Dowangi are the principal islands; the latter is inhabited.

Anchorage may be had off Sidangoli in 17 fathoms, coral bottom, at about one cable from the shore, with the north-west point of Manomadehe bearing S. 87° E., and the south-west point of the same island S. 24° E.

Passi Lamo, of coral, with a least depth of 2½ fathoms over it, lies 2 miles westward of Tanjong Sidangoli, with the eastern point of Tidore island bearing S. 2°.E. This reef is 7 cables long north-northwest and south-south-east, and 2 cables wide; it shows as light-coloured water.

Plan of Dodinga bay on 2772.

DODINGA BAY (*Lat. 0° 50′ N., Long. 127° 38′ E.*) is separated from Kayu (Kaü) bay, on the east coast, by a narrow isthmus, on which is situated the town of Dodinga. The northern side of the bay is bordered by reefs, which dry at low water, and on which are several islets. The east shore of the bay, for 3½ miles to the southward of Dodinga town, is foul to the distance of from 2 to 5 cables.

A small river discharges in the north-east corner of the bay, by Dodinga. It can only be entered at high water, but inside the depths are from one to 1½ fathoms. From Dodinga a footpath leads across the isthmus to Bobane bay. A great part of the goods destined for the east coast of the island, or from thence to Ternate, pass through Dodinga.

General charts 2575, 942a, 1263.

Plan of Dodinga bay on 2772. Var. 2° 20′ E.

Dangers.—North side.—There are several detached reefs lying along the north side of the bay, which extend to the distance of about 1½ miles from the shore; Pasir Galesa besar, the largest, is about two-thirds of a mile in extent, and the most eastern.

About 5 miles westward of the western of these reefs, and south-south-eastward of Tanjong Sidangoli, is a patch of discoloured water, with a depth of about 2 fathoms.

South side.—Off the south side of Dodinga bay there are three detached reefs, each about half a mile in extent; the westernmost lies N.W. 2 miles, and the others North 2 and 1½ miles respectively from Tanjong Oba (*Lat. 0° 45′ N., Long. 127° 34′ E.*).

A shoal with a depth of about 2 fathoms lies 7½ cables N. 60° E. from the western extremity of Tanjong Oba.

Plan of Gurapien anchorage on 2772.

A shoal with a least depth of 2 fathoms lies with the western extreme of Tanjong Oba bearing S. 42° W., distant about 1½ miles.

A reef, about half a mile in extent upon which there is less than 6 feet water, lies with the north-west point of Pulo Sibu bearing E. ½ N., distant 5¾ cables, and is a danger to vessels approaching Gurapien anchorage.

Plan of Dodinga bay on 2772.

Entering Dodinga bay, an E. by N. ¼ N. course steered for the southernmost high hill southward of Dodinga leads between the reefs on either side of the bay.

Anchorages.—There appears to be well-sheltered limited anchorage off Dodinga town, in a depth of 16 fathoms, in a small bay formed by a peninsula jutting out southward and an islet standing on the eastern shore reef.

Plan of Gurapien anchorage on 2772.

Gurapien anchorage is on the southern shore of Dodinga bay, westward of Pulo Sibu, with the north-west extreme of that island bearing N.E. by E. distant 3½ cables, and the point near Gurapien village S.E. ½ S.; the depth is 20 fathoms. A broad shore reef extends out to the distance of 6 cables in front of the coast by Gurapien, and 1½ cables outside its edge is a small detached head covered by 5 fathoms.

Chart 942a, Eastern archipelago, eastern portion.

The coast south of Dodinga bay for 10 miles, as far as Tanjong Akelamo, is high, steep, and clean, and can be approached to the distance of half a mile; the only known dangers off it are Pasir Rajah sandbanks. Tanjong Akelamo is low. Anchorage may be had off the

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

village of Sagona, south of the point, in a depth of 25 to 30 fathoms. Good water can be obtained from a small river to the southward of the village; deer, pigs, poultry, and firewood are procurable.

Pasir Rajah consists of two small sandbanks, covered at high water, which lie about 3 miles west of Tanjong Akelamo, and about 4 miles E. ½ N. of the north point of Mareh island. These banks, which are in the fairway from Ternate to Patientie strait, may be readily seen by their white colour during daylight, and can be avoided at night by keeping the Gillolo coast aboard.

Coast.—From Sagona village to the southward the coast must not be closely approached, as it is bordered by rocky islets and reefs as far as Pulo Joji, an islet which lies about 1½ miles westward of Tanjong Tesco.

Plan of Payahe road on 912.

Payahe road (*Lat. 0° 22′ N., Long. 127° 42′ E.*).—From Pulo Joji the coast trends eastward about 6½ miles, and then southward for 10 miles, forming a large bay with the village of Gitta on the north side near the entrance, and at the head of the bay the village of Payahe. Payahe road is off the village of that name.

Dangers.—A reef projects from Tanjong Tesco, on the north side of the bay; from the edge of the discoloured water the south-west point of Pulo Joji bears N. 65° W.

A coral bank, about 165 yards in length and partly dry at low water, lies S.E. by E. from Tanjong Tesco, and about one mile from the north shore of the bay; it is steep to, and lies in the approach to Payahe road.

At about 2¼ miles eastward of Tanjong Tesco is a reef, distinguishable by discoloured water.

Anchorage.—There is anchorage in Payahe road off Payahe village in from 8 to 15 fathoms.

Chart 942a, Eastern archipelago, eastern portion.

Maidi, a village, situated about 9 miles southward of Payahe, has anchorage off it in about 16 fathoms close to the shore reef, which is narrow here, but further northward extends some distance from the shore, and is partially dry at low water.

From Maidi to Tanjong Dieke (Dolli), about 23 miles southward, the coast is steep-to generally, and may be closely approached in most places. It is bordered by a beach with wooded hills behind.

Bank.—A small sandbank lies 3½ miles south of Pulo Joji, and 11 miles east of the south-east point of Makyan island. Information is wanting as to the depth of water over it.

General charts 942a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Nassau rock, 150 feet long and 30 feet broad, with 4 feet water over it (discovered by the *Nassau* in 1872), lies 10½ miles S. ⅜ E. of Pulo Joji, and 11½ miles E. by N. ⅛ N. from Miskien island; it is steep-to, and dangerous, being directly in the track of vessels making for Patientie strait from the northward. The west end of Mareh island, shut in with the east end of Motir island, leads well to the westward of it. On the old chart of 1846 a bank was shown 2 miles west of Nassau rock; this is still retained, marked D. At about 5½ miles eastward of Nassau rock, and near the shore, is a reef with less than 6 feet over it.

PATIENTIE (DOROKUSU) STRAIT, which separates Bachian and Gillolo islands, is 8 miles wide at the northern entrance, between Tanjong Dieke and Batu Sombo island, but is very much obstructed further south by the Lari islands.

A small reef, with a depth of 2 fathoms over it, lies close to the Gillolo shore, and separated from it by a deep narrow passage; it bears E. ¾ S., distant about 15 miles from Latau island. The Gillolo shore is generally clean, and may be approached to a distance of one mile. There is anchorage on the Gillolo side off the village of Saketta, east-north-east from Salintji island, in 20 fathoms, sand; also in about 26 fathoms, sand, off the village of Oha, half a mile northward of the 2-fathoms reef above mentioned; Oha village, bearing N.E., leads to the anchorage. There is good anchorage in 15 to 26 fathoms, S.S.E. from Latau.

Directions.—When entering Patientie strait from the northward, pass about 2 miles westward of Tanjong Dieke, and then steer about S. by E. ¾ E. for Latau island (*Lat. 0° 27′ S., Long. 127° 41′ E.*).

The best channel appears to be between the conical central Lari islet, Salintji, and Pakol, a small islet southward of it; the channel between Pakol and Latau may also be used. Salintji island, when seen from about Steep point, appears very steep on the west side; islets lie east and west of it. The passage between the north-eastern island, St. Lamo, and the Gillolo coast is very narrow and shallow. After passing through the narrows going South, Steep point (Bo ubo) should be steered for, and passed at one or 2 miles distance, whence course should be shaped southward to pass about 2 miles west of Doworra island, to avoid a steep shoal lying betwen Hennekes point in Bachian and Steep point in Gillolo.

Patientie strait is a useful passage for vessels sailing between Ternate and Amboina in either monsoon, and vessels have been able to beat through the strait by the help of the tides when unable to work to windward westward of Bachian island.

General charts 942a, 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Doworra island, at the southern entrance of Patientie strait, is 1,083 feet high, and when viewed from the eastward appears saddle-shaped; off the eastern end is an islet, and another wooded islet, surrounded by bare rocks, lies 1½ miles south-eastward. On the north-east side are several islets and dangers, extending over 4 miles north-eastward; a reef projects about one cable from the south-west point. The passage west of Doworra should be taken.

Plan of Gane road on 912.

Gane road.—The village of Gane is situated on the western side of a small inlet on the Gillolo coast at the southern entrance of Patientie strait. The village lies behind a slightly projecting point covered with cocoanut trees. The inhabitants are Mohammedans, and occupy their time in hunting and fishing.

Anchorage may be had in about 15 fathoms with the flagstaff bearing N.W., distant 1¾ cables and Great Geelmuiden island just shut in behind the southern entrance point, but the space is rather confined.

When approaching from the northward keep about one mile from the Gillolo shore, and exercise caution when passing between it and the islets and reefs north-eastward of Doworra island; here a small reef extends south-westward from the Gillolo side, and the discoloured water on either side enables a mid-channel course to be steered; the western entrance point of Gane road must be given a good berth.

Chart 942a, Eastern archipelago, eastern portion.

SOUTH POINT of GILLOLO ISLAND and ISLANDS OFF IT.—Tanjong Libobo (*Lat. 0° 55′ S., Long. 128° 27′ E.*), or Cocoanut point, the southern point of Gillolo is low land, with a hill 527 feet high near it, and a small islet, Babi, off it. View *d*, at page 58.

The channel between Tanjong Libobo and Damar island is said to be clear of danger, though it should not be taken by sailing vessels during the east monsoon, except with a commanding breeze, on account of the heavy swell found in it, and then only in daylight. The currents in it are very strong.

Salo or Damar islands.—This group of islands lies to the south of Tanjong Libobo, 4 miles distant. The northern island, Salo-maki or Damar, is rather low, more especially in the middle, with hills that rise steeply on either side, giving it the appearance at a distance of being two separate islands. The highest point of the island is in the south-eastern part, where it reaches 556 feet. On its northern side is a large shallow bay, in which are many small flat coral islets, situated on a shoal bank; the northernmost islet, Pulo Katinai, lies apart. There is good anchorage westward of Pulo

Katinai with its south extreme bearing S.E. ¾ S., and the north point of Salomaki W. ⅜ N., over 1½ cables from the shore reef. There is also anchorage, in a depth of 22 fathoms, about 2½ cables W. by N. of Pulo Katinai, and at a similar distance from the reef, where a vessel can lie less affected by the easterly swell. To approach the latter anchorage steer S.S.W. for the east side of the islet W.S.W. of Pulo Katinai until the northernmost point of Salomaki is seen under the saddle of Doworra island; view *c*, at page 66. The west coast of Damar island should not be closely approached on account of the numerous coral reefs and dense mangroves, which grow far into the sea. Water may be obtained from a small well on Pulo Katinai. There is no water on Damar island.

Jeronga or Hassil island, about 1½ miles southward of Salomaki, is long and low, with two hills in the middle, 709 and 463 feet high respectively; view *a*, at page 66. Of the surrounding islets, Yselmuiden, 753 feet high, southward of the west end of Jeronga, is the largest.

Black rock, 13 feet high, and encircled by reef, lies eastward 3 miles from the islets on the south side of Hassil island, and S. 18° E. from the hill over Tanjong Libobo; the surrounding reef extends 2 miles east-north-east and west-south-west. The rock should be carefully avoided during the night, and a wide berth be given to it, for the soundings in the vicinity afford no guide. View *a*, at page 80.

Great Geelmuiden, about 6 miles westward of Jeronga, is flat and low except in the centre, where a conical hill rises to a height of 394 feet; view *d*, at page 66. Little Geelmuiden is quite flat.

Five islands comprise a group of at least seven small and low coral islands, covering an area about 3 miles in diameter, the north-eastern and eastern of them being 84 and 98 feet high, respectively, and are situated about 3 miles westward of Great Geelmuiden. They are visible from a distance of 14 miles, but at night are difficult to distinguish. There is discoloured water about 8 miles westward of the group, but no shoal.

The East coast of Gillolo is described hereafter with Gillolo passage; *see* page 90.

ISLANDS WEST of GILLOLO. — Hieri island (*Lat. 0° 54′ N., Long. 127° 17′ E.*), lying to the northward of Ternate, is irregular in shape, about 1¾ miles in diameter, and rises to a conical peak, 2,166 feet high. Several rocks above water lie off the north side of Hieri. There are numerous deer and wild pigs on the island, which is uninhabited. View *b*, at page 66.

TERNATE ISLAND, which lies about 8 miles west-south-westward from Tanjong Sidangoli, about the centre of the west coast of

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Gillolo, is about 8 miles long north and south, 6 miles broad, and is composed almost exclusively of a conical volcano 5,184 feet in height.

This volcano has been in a state of constant activity for more than 300 years, during which period there have been no less than twelve eruptions and violent earthquakes; the most violent during the last century occurred in 1840, and was attended by great loss of property. The more recent eruptions in 1862, 1871, and 1907, were much less severe; the northern half of the island has suffered most.

The island is densely wooded, and on the south and south-east coasts is cultivated. Near Tanjong Kaju Merah, the south-east point of the island, is the ruin of a fort, and on the beach a petroleum depôt. Besides the town of Ternate, there are the villages of Kastela, on the south-west coast, Takome, near the north point, Dufa Dufa, northward of Ternate, and two others on the road from Ternate to Kastela.

The shores of the island appear to be steep-to, and with no dangers beyond a few reefs extending out from a quarter to half a mile.

The population of the island is about 9,060. View *b*, at page 66.

Plan of Ternate road on 2772.

The town of Ternate (*Lat. 0° 47′ N., Long. 127° 22′ E.*) lies on the east coast, and is beautifully situated upon the shore at the foot of the mountain. It is the seat of the Dutch Resident, and also that of the Sultan. The island is governed by the Sultan, who holds his territory by feudal tenure from the Netherlands Government, and is bound by a contract. The Controleur of N. Gillolo resides here.

The town contains a Protestant church, schools, post-office, club-house, &c. Fort Orange, a square stone structure, surrounded by a dry ditch, is situated a short distance northward of the church; about one mile farther north is another small fort, built on a rock in the water, and surrounded by a reef with 6 fathoms of water near it. Ternate was declared a free port in 1854. The town contained 3,616 inhabitants in 1905, of whom 394 were Europeans and 721 Chinese.

Piers.—Lights.—Buoys.—There are two piers; the southern one is a coaling pier, alongside of which there is water for large vessels, securing to four dolphins. A *green fixed* light is exhibited at its head.

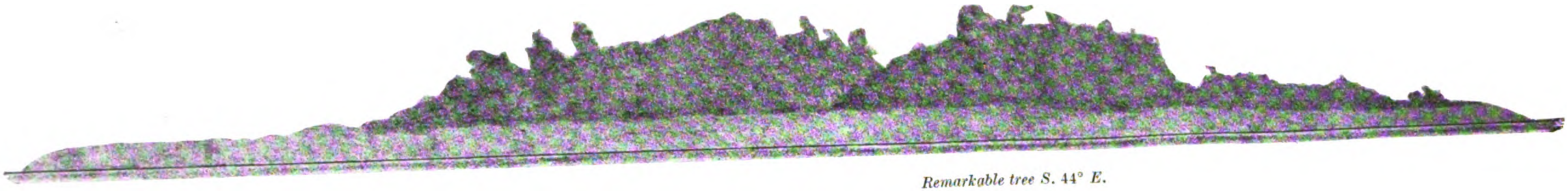
The northern pier is abreast the Harbour Office, and is for boats, there being only 3 feet of water at its outer end, marked by a *red fixed* light and a signal mast.

Two mooring buoys have been established, one to the north-eastward and the other to the south-eastward of the south pier.

Anchorage.—The best anchorage in Ternate road is in a depth of about 15 fathoms, at the distance of about 1¾ cables from the shore, with the flagstaff of the residency bearing N. 65° W. and the outer end

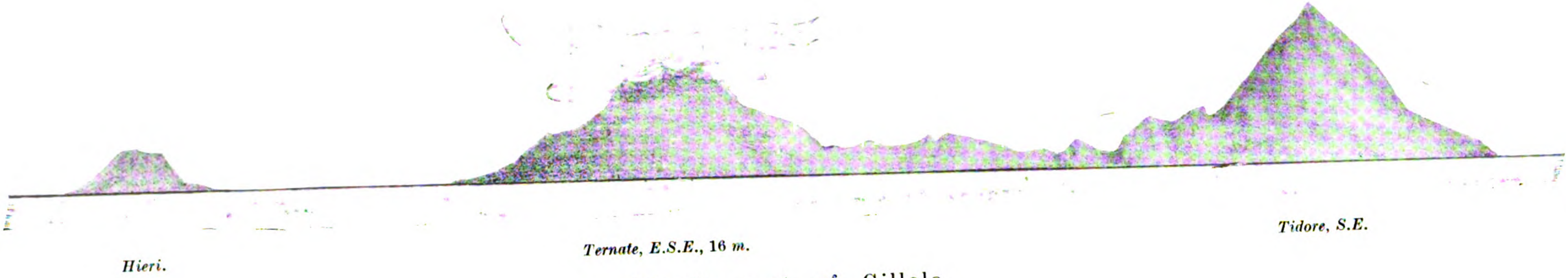
General charts 942a, 1263.

(a)


Remarkable tree S. 44° E.

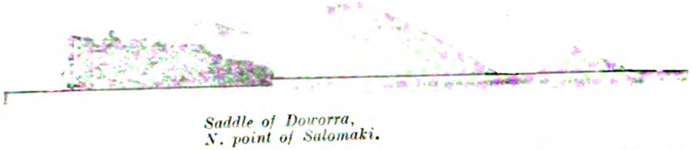
Jeronga or Hassil island.

(b)


Hieri.
Ternate, E.S.E., 16 m.
Tidore, S.E.

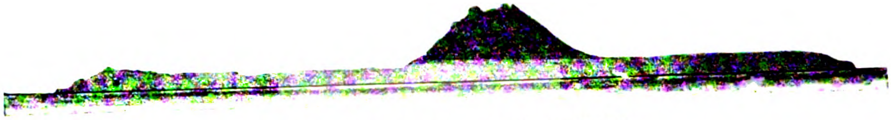
Islands west of Gillolo.

(c)



Mark for anchorage W. by N. from Pulo Katinai.

(d)



Great Geelmuiden island S. 30° W.

Plan of Ternate road on 2772. Var. 2° 20′ E.

of the southern pier S. 33° W. Vessels making more than a temporary stay should moor, as the bank is very steep, the holding ground bad, and the tidal streams strong.

Supplies.—The usual supplies can be obtained. Cattle are killed three times a week unless a ship will take sufficient to make it worth killing specially for her. The beef and bread are inferior in quality, and dear. Poultry is plentiful and cheap, as are also vegetables. Fruit of all kinds is plentiful during the season.

Water.—Water, from an artesian well, will be sent off in a small open boat holding about one ton, if one day's notice is given. Three tons can be supplied per diem in this way. If more convenient a ship can use her own boats for getting it on board. Very good water is also supplied from a pipe at the coaling pier.

Coal.—Two large coal sheds stand upon the shore abreast the coal wharf; between 2,000 and 3,000 tons are imported annually, and from 300 to 1,000 tons are usually kept in stock. The coal belongs to the Government, and is either from Australia or Sumatra. The price is approximately forty shillings per ton.

Trade.—The principal imports into Ternate and dependencies are rice, provisions, flour, cotton goods, tobacco, brass-ware, lamps, &c., of the total value in 1909 of £64,542. The exports are copal, copra, cane, dammar, ebony, mace, nutmegs, birds' skins, mother-of-pearl, turtle, &c., of a total value in 1909 of £156,282.

Communication.—Wee Ben Line (British) calls every three weeks from Singapore; North German Lloyd (German) call every month from Singapore; the Royal Netherlands Steam Packet Company's vessels call every four weeks with mails, from Batavia and Celébes island, and a vessel of the same company on the North New Guinea route calls at Ternate once in four weeks both on the outward and return voyages; *see* page 17.

Tides (*Lat. 0° 47′ N., Long. 127° 22′ E.*).—It is high water, full and change, at Ternate, deduced from one day's observation by the *Challenger*, at 5h. 10m.; springs rise about 4 feet.

The tide at Ternate is mixed with a preponderating double-daily character; in the second half of March and September, the tide, about 0° of the moon's declination, is even purely double-daily. On the other hand, in the second half of June and December, should the half-monthly greatest declination of the moon occur about one day after the quarters, then the movement of the water assumes a single-daily character. The double-daily tide has spring tide 1½ days after full and change, with high water at 6½ hours, and an average range of 3½ feet, neap tide at a like period after the quarters, with high water

General charts 942a, 1263.

Plan of Ternate road on 2772. Var. 2° 20′ E.

at 12h. 30m., and an average range of 6 inches. About the second half of March and September the spring range increases to 4 feet, and that of neaps becomes imperceptible. About the second half of June and December the spring range decreases to 3 feet, and that of neaps increases to one foot.

The single-daily tide has high water about 1st January at 4h. p.m.; 1st April at 10h. a.m.; 1st July at 4h. a.m.; and 1st October at 10h. p.m.; spring tide half a day after the half-monthly greatest declination of the moon, with an extremely slight range. In the second half of June and December these ranges increase to fully 2 and almost one foot; in the second half of March and September that of springs decreases to fully one foot, and that of neaps becomes insignificant.

The high waters of the spring tides fall together about the beginning of June and the beginning of December; the highest water levels are then reached, respectively, about 6½ hours a.m. and p.m.

Should 0° of the moon's declination occur about one day after the quarters, then the movement of the water is but slight, and becomes almost imperceptible, as is also the case about the second half of the months of March and September.

Weather.—From a register kept by the surgeon of the Dutch settlement at Ternate, extending over a period of 8 years, from 1860 to 1867, inclusive, it was deduced that the north-east monsoon blows through January, February, and March, the wind varying from north-east to north-west. After a month of variable winds, the south-west monsoon commences in May and ends in October, its direction being from south-east to south-west. During November and December the winds are again variable.

On comparing the records of the weather at Ternate with those at Amboina and stations eastward, it would appear that, during the periods of their greatest strength, the north-east monsoon passing through the Molucca passage turns eastward and becomes the north-west monsoon in the Banda and Arafura seas; and that the south-east monsoon blowing through the Arafura and Banda seas, bends into the Molucca passage, and joins the south-west monsoon in the Pacific.

Climate (*Lat. 0° 47′ N., Long. 127° 22′ E.*).—The climate is healthy, to which the absence of excessive heat and the fresh sea breezes contribute. Severe epidemics sometimes break out among the natives. The dry monsoon is marked by repeated rainstorms, and continuous heat, lasting from 5 to 6 weeks.

Heavy thunderstorms are exceptional.

The mean temperature for 8 years, from 1860 to 1867, inclusive, was 80·7. The greatest range of temperature is 16° Fahr.; in the early

General charts 942a, 1263.

Plan of Ternate road on 2772. Var. 2° 20′ E.

morning the thermometer varies between 72° and 76°, at noon it has risen to 82° or 84°, and is about 2° higher during the afternoon; it then falls slowly, and in the latter part of the night reaches the morning figure. The land wind from Gillolo does not reach Ternate, which accounts for the high nightly temperature.

Rain.—The annual rainfall amounts to an average of about 84 inches. December, January, April, May, and June, are the wettest months; July, August, September, and October are the driest, but least rain falls in September, the amount being about 4 inches. *See* page 324.

Plan of Ternate road and channel on 2772.

Ternate channel, between Ternate and Maitara, should not be taken by a sailing vessel except with a commanding breeze, on account of the eddies. The flood-stream in it, coming from the north-eastward, forms numerous tide-rips and eddies, which give the appearance of broken water over a sunken reef. If unable to make way in it, a vessel might anchor on the south shore of Ternate in a depth of 13 fathoms, shells, with Maitara peak bearing S. ½ E.; there is no anchorage off Maitara island.

Maitara island is about 1,180 feet high, conical, and covered with cocoanut trees, cultivated by the Tidorese, as the trees do not thrive on Tidore; it is surrounded by a reef which extends out about 4 cables from the west side and for one cable along the whole of the north coast. There is a signal station on the summit of Maitara island.

Chart 942a, Eastern archipelago, eastern portion.

Tidore (*Lat. 0° 40′ N., Long. 127° 24′ E.*) is an island about the same size as Ternate, from which it is separated by a passage more than one mile in width. It is of volcanic formation, the southern half of the island consisting of a regular cone, which rises to a height of about 5,808 feet, and is more pointed than the peak of Ternate; the summit is bare, the central part thickly wooded, and below 1,000 feet the slopes are cultivated, especially on the eastern side. The northern half of the island is a rugged mass of hills which descend steeply to the sea, with here and there a few level spots near the beach. There has been no eruption within the memory of man. The soil is remarkably fertile, and the island is well cultivated, the natives being more industrious and inclined to agriculture than those of Ternate. Fruit, cotton, tobacco, nutmegs, and coffee are successfully cultivated. View *b*, at page 66.

A road along the coast leads from Soasia to the village of Marieku on the west coast, the village consists of two parts, one on the beach the other on a height. Just opposite Maitara island, in a small bay, is the village of Rum, and a little southward the village of Omé, both recognisable by the high roofs of the mosques showing above the houses.

Tilongga islet, off the north-east coast of Ternate, is no more than a rock covered with vegetation.

The island is governed by a Sultan who holds his territory by feudal tenure from the Netherlands Government, and is bound by a contract. Trade appears to be confined to the surrounding islands. Fish is one of the principal exports; the imports are rice and sago. The population amounts to about 9,000.

The chief town is Soasia, on the east coast. In front of the town there is a reef of rocks and stones, to some extent natural and partly artificial.

There is anchorage off the town in a depth of 30 fathoms, sand, at less than 2 cables from the reef, with the north-west point of Mareh island touching the south-east point of Tidore, and the mosque bearing S. 87° W. There are tide-rips in the anchorage.

There is anchorage off Rum in 20 fathoms, sand, with the north-east point of Maitara bearing N. 70° W., and the south-east point S. 5° W. A strong current runs here.

Mareh island lies 2 miles south of Tidore; there is anchorage near its south point, sheltered from the north-east. The island received the name of Potbakers from the Dutch, on account of the potter's earth found on the north-east point, near which is a hill 617 feet high. The island has some steep hills on it, the highest of which has an elevation of 1,181 feet. It has about 200 inhabitants, who are engaged in fishing and in making earthenware vessels from clay found chiefly on a hill on the south-west side of the island. The only village is on the east side. View *b*, at page 80.

There is anchorage off the village in 30 fathoms, hard bottom, with the mosque bearing S. 65° W., and the south-east point of Mareh touching the north-west point of Motir island.

Motir island (*Lat. 0° 27′ N., Long. 127° 24′ E.*), 5 miles south of Mareh, is another volcanic cone, 2,756 feet high, but no eruption is known to have taken place; according to Gregorij, the island can be closely approached everywhere except at the south-west point, where a reef projects; other reports state that the island is difficult of access except to small craft, being entirely surrounded by reefs and shoals. Reefs extend half a mile from the S.E. point, and many suspicious patches were seen in the northern part of the channel between Motir and Makyan. There is little reef on the east side of the island. There are no villages; the people who possess plantations and gardens belong to other islands, and remain on Motir temporarily only. The east coast is covered with plantations and gardens, and with forests to the summits of the mountains. View *b*, at page 80.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Makyan island, 4 miles south of Motir, was in the year 1861 devastated by a volcanic eruption, and many of the population destroyed or obliged to leave the island. Notwithstanding this, Dr. Bernstein in his last visits, in 1862-64, found even the ground which had been most injured again covered by luxuriant vegetation. The last violent eruption occurred in June, 1890; the mountain has smooth slopes, with a blunt top, and a deep cleft in it. The top was split asunder in the eruption of 1760. The island has a rugged and uneven appearance, is 4,166 feet high, and is generally steep except on the eastern side, where a part is flat. The coasts are steep-to, and the channels north and south of the island are safe, except the north side of the former channel. View *c*, at page 80.

The population of the island is about 8,000, all Mohammedans and very industrious; they are engaged in agriculture, fishing, and weaving. There are no sago palms on the island, and the sago required for food is brought from Gillolo. There are several villages.

Plan of Powati anchorage on 912.

There is anchorage off Powati on the east side in a depth of 30 fathoms, at a distance of about one cable from the shore, with the highest peak of the island bearing S. 65° W.

Chart 942a, Eastern archipelago, eastern portion.

Kayoa is an island nearly 10 miles in length, lying 9 miles south of Makyan; a range of hills runs almost through its entire length, which reach an elevation of 1,181 feet.

Miskien islet (*Lat. 0° 9′ N., Long. 127° 25′ E.*) lies northward of Kayoa, separated from it by a narrow strait; a small islet lies southward of it.

Anchorages.—There is anchorage in a bay on the east side of Kayoa island, southward of the north-east point, which is cliffy and steep-to, in 17 fathoms, coral bottom, with the north-east point bearing N. 12° E. and the south point of the bay, S. 40° E.

Off the village of Guruah Ping on the south-west side of the island there is anchorage in 7 fathoms with the mosque bearing N. 64° E. To reach this anchorage steer S. 80° E. for the southernmost hill on Kayoa island.

Lolun island, S.S.W. of Kayoa, is joined to that island by a reef, upon which there are a small island and several islets. Only small craft can pass between Lolun and Kayoa.

Guarichi or **Manuscript islands,** south-west of Makyan, are a group of five small wooded islets of moderate height, and several bare rocks. Gafi, the northernmost, furnishes edible birds' nests; Leli, the westernmost, is 20 miles westward of Kayoa. By daylight they are not dangerous, as most of them are visible; at night it is well to give them a wide berth, as the set of the currents in their vicinity is uncertain.

Wolf rock (*Lat. 0° 12′ N., Long. 126° 53′ E.*), lying about 38 miles south-west of Tidore, is nearly level with the surface, the sea breaking over it, when it becomes visible in the hollow of the wave. It was examined in 1846 by Lieut. de Brauw, who obtained a depth of 16 fathoms at the distance of 1½ cables southward of it, and 13 fathoms at one cable to the northward; no other shoal was found in the vicinity. From the rock the most northerly of the Guarichi islets (Gafi) bears E. ½ S., distant 14 miles.

Tameti island, or Little Tawali, lies about 8 miles westward of Lolun island, and has a number of small islets off its northern end; it is covered with cocoanut trees.

Lata Lata islands comprise the two islands Tapi and Muari. Tapi consists properly of two islands lying on the same reef. Muari is separated from Tapi by a narrow passage only about 40 yards wide in places. The highest peak of Tapi is 1,280 feet above the sea. Off the south and west extremities of Tapi are two small islets about 200 feet high, and other islets lie close eastward and northward of the group. A sunken rock, the position of which is doubtful, is charted about one mile southward of the south point of Tapi. Captain Forrest, in 1775, anchored in Malaleo cove, on the north-west side of Tapi island, in 4 fathoms, close to the shore. The depth in the middle of the cove is 12 fathoms; the eastern entrance point is bordered by a reef.

The Toapen islets are three small rocks about 130 feet high, lying 4 miles westward of Muari, the northern of the Lata Lata islands.

BACHIAN ISLAND, the largest and most southern of the true Moluccas, is 46 miles long north-west and south-east, with a mean width of about 20 miles. The island is generally mountainous, especially towards the north and south; the central isthmus, which connects these two portions, being of a much lower elevation. The highest peaks are situated in the southern part of the island, Mounts Sibela and Zout being respectively 7,215 and 3,150 feet high. There are no volcanoes, but there are sulphurous springs of a high temperature at the foot of Mount Sibela, and the island is subject to occasional shocks of earthquake.

Numerous streams flow from the mountains, but only a few can be entered by light boats. On the east coast are Babang and Lapan bays; on the south coast, Waya Uga bay; on the west coast, Bachian bay; and on the north coast, Loit bay. In all these bays there is anchorage close to the shore.

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Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

The chart shows reefs extending along the west side of the northern part of the island and also off the points on the southern part; off Tanjong Selang is an island of the same name, with a large reef southward of it.

The whole island is covered by an almost impenetrable forest, and on the hills are found wild spices, especially cloves, and also trees that furnish excellent timber.

The inhabitants are about 3,000 in number, a great part of them living in Bachian town. They are partly Christian and partly Mohammedan; the Christians are from Amboina and elsewhere, as well as belonging to Bachian. The Mohammedans are a mixed race, and are idle and careless, and support themselves chiefly by fishing.

Bachian island, together with the islands off the west coast, are under the jurisdiction of the native sultan. The Netherlands Government is represented by a Posthouder.

Plan of Labuha (Bachian) road on 912.

Bachian town (*Lat. 0° 39′ S., Long. 127° 28′ E.*), the seat of the Posthouder, and residence of the Sultan, is situated at the head of a deep and wide bay, about the middle of the west coast. It comprises two villages, the Christian village of Labuha, and the Mohammedan village of Amassing, near the river of that name. Between the two villages is the palace of the Sultan, a decayed stone building; the other houses, except the mosque, are of bamboo. In Labuha are the residence of the Posthouder, a Protestant church, two schools, and a hospital; Fort Barneveld lies behind the village. Labuha had 2,666 inhabitants in 1905, of whom 37 were Europeans.

The anchorage is off the east end of the town, in the north-east corner of the bay, in a depth of from 7 to 9 fathoms, mud and sand, good holding ground; it is open to south-west winds, but there is less swell than in other parts of the bay; with easterly winds there is a considerable swell. The wreck of a large three-masted ship lies in the roadstead, with her bulwarks and bowsprit above water, and the three lower masts still upright (1908).

Trade.—The trade is principally in the hands of the Bachian Trading Company, which has been established some years, and has large plantations of coffee, cacao, nutmegs, and tobacco; gum copal and dammar are also exported. The company has the exclusive right to the exploitation of all minerals, forests, waste lands, and pearl banks.

Communication.—Vessels of the Royal Netherlands Steam Packet Company, on the route from Amboina to North New Guinea, call once in four weeks, both on the outward and return voyages. *See* page 17.

General charts 942a, 2759a, 1263.

Chart 942a, Eastern archipelago. Var. 2° 20′ E.

Batu Sombo island lies about 1½ miles northward of the north-eastern part of Bachian; reefs extend from its south-east and west points. A bank, dry at low water, is charted N. 60° W., nearly 4 miles from the west end of Batu Sombo.

Great Tawali island (Kasiruta), lying close westward of the north end of Bachian, is about 17 miles long north and south, and 13 miles wide; it is high and flat-topped, its most elevated peak being 2,609 feet above the sea.

On the west side of this island there is a small bay, Imbu Imbu (Inbu Inbu), or Bissori (*Lat. 0° 26′ S., Long. 127° 3′ E.*), with a small island near the north point, off which a reef projects. A depth of 16 to 14 fathoms will be found eastward of the little island bearing North. Good water can be obtained here.

There is anchorage in 30 fathoms in Mamang bay, farther north, at 2 cables from the shore; off the north point of the bay is a sugar-loaf rock.

The passage between Tawali and Lata Lata islands is said to be free from danger, but the chart shows a reef extending some distance from the north-west point of Great Tawali. The brig *Nautilus* worked through from south to north in 1839. There are several islands off the south-east part of Tawali, between which and Bachian island lies the narrow Herberg strait.

There is anchorage in 45 fathoms eastward of Little Tawali island, situated about a mile north-eastward of Great Tawali, off the northern entrance of Sambakki strait, with the north point of the island bearing N. 63° W., and the south-east point S.W. Close up to the shore of the island there was no bottom with 15 fathoms of line. This island must not be confused with Tameti, the alternative name for which is also Little Tawali, as charted.

Sambakki and Herberg straits.—Sambakki strait, between Bachian and Great Tawali islands, is only 1½ cables wide between the islets and reefs at its northern entrance; within, it widens out to a breadth of about 2½ miles, and again gradually narrowing becomes quite contracted at Herberg strait, the southern approach. The western shore is fringed by reef, as is also the eastern side northward of Andari. About 4 miles within the northern entrance, Paarl bank projects out to the distance of about one mile from Great Tawali island; its outer edge was marked, in 1899, by a perch beacon surmounted with a cross. Tanjong Andari, and the Bachian coast for about 2 miles to the southward of it, is clean-to; about one mile further south on this side is Passinondang bank, dry at low water, and with a little clump of young bakau-trees on its outer side; this bank should be passed at a distance of fully a cable westward.

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Herberg strait, formed between the Bachian shore and the group of islands extending about 5 miles south-eastward from the southern part of Great Tawali, is very narrow, less than half a cable; the islet on its west side, and the rock covered with vegetation on the east side are steep-to. This channel offers no difficulty to steam vessels of about 800 tons displacement, and can be used with advantage by them when bound northward in the north-west monsoon, which blows strong from N.N.W. outside Tawali island. The passage through the narrows is more easily made when taken against the current.

The chart states that the Sambakki strait is only available for very small vessels.

Anchorages.—There is anchorage off Sambaki village in Sambakki strait, in 11 fathoms, with the centre of the village bearing E. by S. Closer inshore the depth soon decreases to 3 fathoms.

There is also anchorage off Andari village, in 9 fathoms, with the middle of the village bearing S. 10° E.

Mandioli island (*Lat. 0° 45′ S., Long. 127° 15′ E.*), 15 miles long north-west and south-east, 8 miles wide (except at the narrower northern end), and 1,280 feet high, lies about 8 miles westward of Bachian, and there is a chain of islands and islets stretching across between them. On the north-east side of the island there is an establishment of the Bachian Company, off which there is anchorage in 7 fathoms.

The chart shows reefs bordering a great part of the island, and a detached rock of less than 6 feet water about 2 miles off the north point; north-eastward of Waja village, on the eastern side of the island, a drying bank is shown near the shore.

The islets Babi and Sao (the latter is low) lie respectively about 3 and 5 miles W.N.W. from the northern end of Mandioli; several reefs lie southward and eastward of the islets. On the east side of Babi there is anchorage in a depth of 13 fathoms.

Gamyaka reef.—The chart shows a narrow reef about 12 miles in length north-north-west and south-south-east, with depths of from 2 to 5 fathoms over it, as being situated about 5 miles westward of Mandioli, with a bank that dries named Gamyaka on the middle of it.

Bachian strait, between Mandioli island and the south-west end of Bachian, is about 7 miles wide at its southern entrance. The northern approach between Obit island and the coast northward of Bachian bay is very narrow; the channel lies towards the islets which stand near the Bachian shore, but the passage between Mandioli and

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

the small islets eastward of it may also be used. The currents in the strait are said to be very strong and irregular, especially in the northern part.

Current.—A constant current to the northward was experienced by H.M.S. *Flying Fish* in September, 1885, during a search for the alleged Bahia reef, reported to exist about 25 miles S.W. of Mandioli island, the wind being light from the southward all the time. In November, 1891, H.M.S. *Penguin* found the current on the west coast of Gillolo setting S. by E. at the rate of 1½ miles an hour. It is stated that there is always a current to the southward on this coast during the north-west monsoon.

Severe tide-rips are experienced extending over a space of about 30 miles to the west and north-west of the Ombi islands.

OMBI MAJOR or **OMBIRA** (*Lat 1° 30′ S., Long. 127° 40′ E.*), lies about 27 miles southward of Bachian island and on the north side of Pitt passage. It is about 48 miles long, east and west, and 20 miles wide; it is lofty, the highest part being 4,887 feet high; the mountains decrease in height towards the east, and the eastern end of the island, for about 10 miles, is low, and marshy in places. There are no roads or footpaths, and the few natives that live on the coast do not venture far inland. There are numerous rivers, which descend steeply from the hills; in the lower part of their course the banks are low. Only boats can enter these rivers, nearly all of which have sandbanks in front of the entrance, which obstruct the approach. The river water is clear and drinkable. Ombi Major is but scantily populated; the chief produce is sago, but people from the neighbouring islands come to collect wild nutmegs, dammar, and rattans in the forests, or for the purpose of fishing.

Pearls and pearl shell are found off the north and west coasts of the island.

Off the north-west coast, 5½ miles eastward of Tanjong Pala, lies the high islet of Kadera, and about 4 miles farther north-eastward is Laiwui islet, on which, in 1899, stood only one tree. Between Tanjong Pala and Laiwui islet are many uncharted dangers.

Over Tanjong Pala the north-west point of the island is a remarkable bluff, with a knob-like summit, probably a clump of trees, higher than the surrounding forest. Five miles southward of this bluff, and close to the shore, is Malamala island, from the western side of which a reef runs out; the passage between Malamala and Ombi Major is narrow, deep, and clear.

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Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Anchorages.—Off Laiwui, an establishment of the Ombi company on the north coast of the island, there is good anchorage in 13 fathoms, good holding ground of mud, with the flagstaff bearing S. 49° E., and the north point of Kadera islet S. 59° W., or in 12 fathoms with the company's large shed bearing between S.S.W. and S.W. by S.

Near Loji, on the west coast, there is anchorage in 7 fathoms, small stones and shells, at about 4 cables from the shore, with the east point of Malamala island bearing N. 2° E. and the village E.S.E. Near this village and close to the shore are the ruins of an old fort. Northward of the village a reef with breakers extends about 3 cables from the shore.

Off Akilamoh, at the south-west point of the island, there is anchorage in 16 fathoms, sand and mud, with the east point of Malamala island bearing N. 8° E., and the mouth of the river E.S.E.

Off Wai Lower, on the south coast, anchorage may be had in 26 fathoms at 1½ cables from the shore; near the river entrance a reef projects, on which are two rocks, the easternmost shaped like an obelisk, and the western one at low water has the form of a gateway.

Ombi Major has several small islets near the coast on the north side, and the chart shows reefs extending some distance from the shore in places on the west and north-west sides and at the south-east point.

Directions for Laiwui.—When approaching Laiwui from the southern end of Patientie strait, bring Doworra island to bear N. 50° E., astern, and steer S. 50° W. until the eastern point of Santare islet bears South, when steer to pass eastward of that islet. Santare is low, and on the bearing mentioned is open of Bisa. Round the reef, steep-to and dry at low water, that extends eastward from Santare, at a distance of about three-quarters of a mile, until a West course can be steered, on which course the first point of Bisa is visible within the farthest point. When a sandy patch with dead trees on the coast of Bisa bears North, alter course to S. 8° W., which will lead towards the anchorage off Laiwui. The tidal streams set east and west between Bisa and Ombi Major. Proceeding eastward from Laiwui, vessels should pass northward of Courier rock. From the southward, the steam packets pass between Ombi Major and Ombi Latu; in this passage, which is clear, keep in mid-channel until abreast of Tanjong Pala, when steer N. 32° E. until the north side of Belang Belang bears N. 70° W., when alter to N. 57° E. When the outermost point of Bisa bears West, steer eastward along the south coast of that island until the Ombi company's shed at Laiwui (*Lat. 1° 21′ S., Long. 127° 32′ E.*) can be steered for on a S. 27° E. bearing.

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Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route, call at Laiwui once a month, both on the outward and return voyages. *See* page 17.

Ombi Latu is about 9 miles in length north-east and south-west, and attains an elevation of about 2,294 feet; upon it are three or four sharp, well-defined peaks, of nearly equal altitude; the north-eastern end lies about 2 miles north-westward of Tanjong Pala, the north-west extreme of Ombi Major. The *Marchesa* anchored in a little bay on the north-east side of the island in a depth of 4 fathoms, well protected from all winds except those from the eastward. A small islet lies over the north-east end of Ombi Latu, and near the south-west point are three islets.

Belang Belang island lies about 2 miles north-east of Ombi Latu; it is a low, wooded, coral island, surrounded by a reef on which are three low islets. There is no drinking water on the island.

Tapat island (*Lat. 1° 13′ S., Long. 127° 24′ E.*), lying 10 miles north of the north-west point of Ombi Major, is about 4 miles in length north and south, and rises in a single round-backed hill to the height of 1,772 feet.

Bisa island, situated eastward of Tapat, and separated from it by a narrow but deep and navigable channel, is 16 miles long, east and west, and narrow; the western part is 1,526 feet high, and the eastern part is lower. Santare islet and two others, smaller, lie off the east point, on the shore reef, which extends some distance south-eastward of Santare. Between Bisa and the coast of Ombi Major there are several reefs.

Anchorage may be had in 12 fathoms near the south-west point of Bisa island with the point bearing N. 73° W., and the east point of Ombi Latu S. 25° W.

Courier rock is about a mile in length and very narrow, with one fathom water over it. It is stated to lie 29 miles S. 85° E. from the northern point of Tapat island, or about $9\frac{1}{2}$ miles N. 71° E. from Santare islet, and the same distance from the north coast of Ombi Major. Its position is doubtful, and it is marked P.D. on the chart.

Westward of Courier rock and $4\frac{1}{4}$ miles N. 54° E. from the eastern extreme of Bisa island, is a depth of 3 fathoms.

Several reefs not shown on the chart are reported to exist between Courier rock and Ombi Major island.

Long island, north-westward of the east point of Ombi Major, is nearly 5 miles in length north-west and south-east, is well wooded and of moderate height, stretching with a remarkably even slope to

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the point that forms its east extremity. The channel inside it is very narrow, and subject to calms, owing to the adjacent high land, and is therefore not recommended for sailing vessels.

Tubalai island, lying 9 miles eastward of the east point of Ombi Major, is a flat tableland for about three-fourths of its extent, sloping down to each end, with a spit of rocks stretching about a cable's length from the south-east end. The island has a sandy beach, and is apparently surrounded by deep water. The channels on either side are safe; Gasé strait to the westward may be used with a westerly wind, but that to the eastward is wider, and seems better with a working wind. View *d*, at page 80.

Gomumu island lies about 7 miles southward of Ombi Major, and its south side is fronted by a wide reef, as charted. It is 837 feet high, and is conspicuous from Pitt passage.

Sophia reef lies 2½ miles north-west of the north-west point of Gomumu island, and about 4 miles from the south coast of Ombi Major. It consists of coral and stones, and has a least depth of 4 fathoms. It is about one mile long east and west, and a quarter of a mile wide, with from 10 to 20 fathoms around.

At 15 miles eastward of Sophia reef a doubtful reef is shown on the chart.

Danger.—Talbot reef (*Lat. 2° 8′ S., Long. 128° 11′ E.*), the position of which is doubtful, lies S. 21° W., distant 34 miles from the eastern end of Tubalai island, as charted.

The master of the ship *Talbot* reported in 1872 (*see* Mercantile Marine Magazine, 1873, page 303) that his vessel grounded on and passed over a reef in lat. 1° 51½′ S., long. 128° 8′ E., with the east side of Tubalai island bearing N.N.E. and High Peak on Gomumu island W.N.W., where the latest charts mark no bottom at 70 fathoms. No soundings were obtained, and there was no discoloration of the water. The position by bearings does not agree with the latitude and longitude given by the master of the vessel, but nearly agrees with the charted position.

The SULA ISLANDS consist of three islands of considerable size, and several smaller ones, lying eastward of the central peninsula of Celébes, to which they belong both geographically and zoologically, though under the government of the Sultan of Ternate. The three northern islands form a chain extending east and west about 135 miles, and are high, bold islands thinly populated.

Taliabu, the westernmost and largest, is very little known. On the south side of the island the coast trends westward, from the south-eastern point, to Safau rivulet, and consists of small beaches, alternating with stones and rocks covered with bushes. A gently-sloping ridge of hills extends along this part of the coast, the highest point being Safau hill. There is anchorage off Safau rivulet in 26 fathoms at one cable from the shore, with Safau hill bearing N. 50° W. Westward of Safau hill is Kamaya bay, about 5 miles westward of Chapalalu strait, and in front of it is a reef with 4½ fathoms on it. A short distance westward there is anchorage in a bay off the mouth of the Wai Nono river in 21 fathoms. Tanjong Wai Nono, on the west side of this bay, is formed by an isolated hill, and is surrounded by a small reef with deep water outside it; the coast on the east side of the point may be recognised by the light colour of the vegetation. Two small rivers, with a small village between them, consisting of some huts on the beach, discharge westward of Tanjong Wai Nono; there is anchorage in 8 fathoms, with the village bearing N. 43° E. Westward of the village is a reef with 2 fathoms on it.

Tanjong Kadai (*Lat. 1° 55′ S., Long. 125° 12′ E.*) is formed by an isolated hill; in the bay eastward of the point two streams discharge, with some huts and cocoanut trees near their mouths, and there is anchorage in 7 fathoms, with Kadai and Mantarara points in line. A sunken rock is charted off Tanjong Kadai.

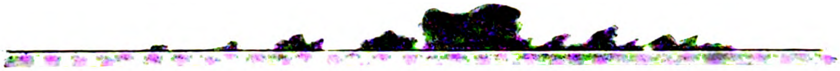
In the large bay formed between Tanjong Kadai and Tanjong Mantarara, nearly 6 miles west-south-westward, four small rivers discharge. There is anchorage off the eastern river entrance, about 3 miles westward of Tanjong Kadai, in 8 fathoms, and off the western river in 15 fathoms. On the beach near the latter anchorage, at the western end of a strip of cocoanut trees, are some hot springs, which may be recognised in the morning by a white vapour above them.

The coast westward and Greyhound strait, between the west coast of Taliabu and the chain of islands and reefs which lie off the eastern coast of Celébes, are out of the scope of this work.

Mangola, the middle island, is about 57 miles long, narrow, and generally high, especially at the north-west end, where it is lofty and rugged; a mountain near the north coast, at about 20 miles from the east end of Mangola, has an elevation of 3,411 feet, but the highest peak is Mount Buja in the western part of the island. Only concerning that part of the south coast westward of Tanjong Ipa Pone are particulars known; there are no villages on that coast.

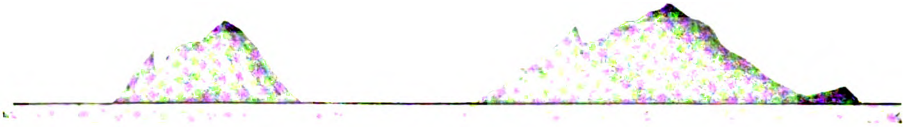
Tanjong Ipa Pone (*Lat. 1° 57′ S., Long. 125° 58′ E.*), situated near the middle of the south coast is low and sandy, and has a narrow reef off it; about one mile west of it is Alifola village, where the coast reef juts out, and further westward the sandy beach gives place to some conspicuous white rocks named Boté; westward of these the mountains

(a)



Black rock, south-eastward of Hassil island.

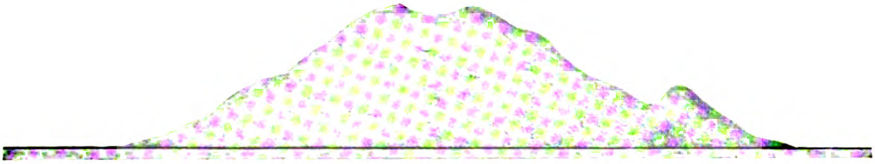
(b)



Mareh, S.E. by S., 20 m. *Motir, S.S.E.*

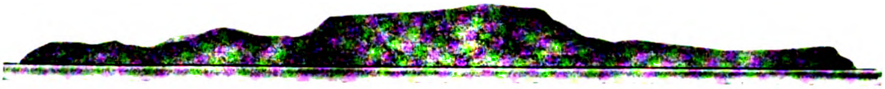
Islands off West coast of Gillolo.

(c)



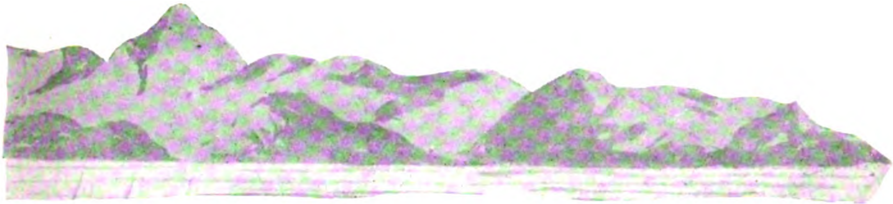
Makyan island, E. by S. 34 m.

(d)



Tubalai island, S. 34° W. 24 m.

(e)



South-east extreme of Gebi island (Gillolo passage), East 8 m.

(f)

Peak N.E. ¾ N., 10 m.

Fau island, south-west side of Gebi (Gillolo passage).

approach near the coast, which bends south-westward and forms Tanjong Buruakoli, off which are two islets. The northern islet, Kada Fota, is steep on the north side and conical, and from Sangnea Mano, the southern islet, which is fairly high, a reef extends westward; a third islet, Fajao Pon, lies north-eastward near the shore, with a 2-fathoms reef to the eastward of it. Nguki Sey, a reef with 1½ fathoms over it, lies about 3 miles eastward of Sangnea Mano, and the same distance S. 37° W. from Boté rocks. Westward of Tanjong Buruakoli the coast is clean, with a small islet near the shore; the mountains again approach the coast.

Abreast the Buja mountain chain two small rivers discharge; in front of the eastern of these one can see far inland. There is no anchorage off this part of the coast. From the western river the coast bends southward to a reddish rocky point; farther westward the coast is more cliffy as far as Tanjong Fargata, recognisable by a long border of weather-beaten and undermined coral limestone. Westward of this point, which is steep-to, is a small bay, into which a stream flows. The depth in the bay decreases gradually from 10 fathoms to 3 fathoms at 1½ cables from the shore. There is anchorage in 5 fathoms with the mouth of the stream bearing N. 53° W.

Tanjong Wai Sipa, the south-west point of Mangola, is visible a long distance from the eastward; close to the point is a pillar rock, and to the westward of it the coast forms a large bay, in which are two low islands. The eastern island is distinguished by a white beach, which shows at low water against the wooded coast. Passi Ipa, the western island, is surrounded by a reef, and lies on the east side of the entrance to Vesuvius bay; its eastern end is connected with the shore by a shallow bank.

Plan of Chapalalu strait and Vesuvius bay on 3440.

Vesuvius bay (*Lat. 1° 52′ S., Long. 125° 27′ E.*) is bounded on the west by Tanjong Sakomata, which is high, densely wooded, and surrounded by a reef half a cable wide. The bay extends northward about 2 miles, is 1½ miles wide in the middle, and over half a mile wide in the entrance, which is deep. In the eastern part there is anchorage in from 10 to 15 fathoms, which is safe, even with a continuance of southerly winds. When entering the bay the western point of Passi Ipa island must be given a good berth; the bay is clear of danger.

Chapalalu strait, the narrow passage separating Mangola and Taliabu islands, varies in width from about 2⅔ to nearly 6 cables, being narrowest at the southern entrance.

General charts 942a, 2759a, 1263.

Plan of Chapalalu strait and Vesuvius bay on 3440. Var. 2° 20′ E.

On the east side, northward of Tanjong Sakomata, is a sand-beach ending in a sloping cliff called Batu Gossok; hence the coast trends northward nearly in a direct line, but with two slightly projecting points, to Tanjong Menjanji; between the two projecting points, which are nearly a quarter of a mile apart, the coast is rocky. Near Tanjong Menjanji, where the hilly land again approaches the coast, there are several huts and traces of gardens. The coast then trends N.E. by N. to Tanjong Ndoffa, and here on the north is a deep inlet.

Crab island lies close to the shore of Mangola, eastward of the northern entrance to the strait.

On the west side, at the southern end, Tanjong Endolodeo (*Lat. 1° 53′ S., Long. 125° 26′ E.*), the south-eastern point of Taliabu island, has an indented shape. It consists of sand-beach backed by cliff in one part, and on its southern side has an isolated hillock which shows up well when seen along the south coast of Taliabu. The point bends round north-westward, and the land becomes higher with a low sand-beach in front, varied by rocky parts, with many trees cast up by the sea. Between Tanjong Endolodeo and Tanjong Lagoi, 1⅔ miles N. by W. ½ W., the coast recedes, forming a bight about 3 cables deep.

Tanjong Lagoi, opposite Tanjong Menjanji, is conspicuous and very steep, and is formed by a spur from the high interior. Lagoi rivulet discharges northward of the point, and the coast is rocky near it, but northward it is low and marshy.

Tanjong Pombu, the north-east point of Taliabu, is surrounded by a wide coast reef. Also there are numerous inlets met with here, forming peninsulas, or perhaps islands, and causing difficulty when making the strait from the northward.

The depths in the strait are generally over 9 fathoms, as charted; close off Batu Gossok there was no bottom at 15 fathoms, and off Tanjong Nubu, about the middle of the eastern side, the depth is 6 fathoms at less than half a cable from the shore.

Danger.—A large detached coral reef, 6 cables long, with a rock at each end and a depth of 5 fathoms between, lies on the eastern side of the strait, between Tanjongs Nubu and Menjanji.

Tidal streams.—The flood stream sets northward, and the ebb southward through the strait. In the southern entrance the tidal stream sometimes runs at the rate of 4 to 4½ knots an hour, and heavy tide-rips and eddies were seen, having the appearance of breakers. Since the most violent rips were observed to be more on the western side of the channel than on the eastern, it is quite possible that a ridge with but little water lies on the western side of the southern entrance. In the northern part of the strait a stream of

Plan of Chapalalu strait and Vesuvius bay on 3440. Var. 2° 20′ E.

4 knots an hour was experienced, and northward of Tanjong Lagoi there were no tide-rips.

Directions.—To enter Chapalalu strait from the southward, pass Batu Gossok at a distance of from one to 1½ cables, observing that here the vessel is liable to sheer about under the influence of the eddies, and then steer across to close the Taliabu shore, keeping 1½ or 2 cables from it, but lessening the distance a little when passing Tanjong Lagoi; then steer more to the eastward, to avoid the reef off Tanjong Pombu (*Lat. 1° 50′ S., Long. 125° 26′ E.*).

From the northward, steer to open the strait, for the many creeks near the entrance may easily give rise to error. Having made out the steep Tanjong Lagoi, steer eastward to bring it to bear S.S.W., and steer for it on that bearing, passing a short distance off it. The reef around Tanjong Pombu must be avoided, and especial care taken not to close Tanjong Menjanji. Near Tanjong Lagoi there is discoloration caused by a large quantiy of seaweed floating on or near the surface, but there is no danger. Having passed Tanjong Lagoi, reverse the directions given from the southward.

Chart 942a, Eastern archipelago, eastern portion.

Lisamatula, the easternmost island, is uninhabited; the sides are steep and thickly wooded; the top presents an even, rounded appearance, the highest part being 802 feet high. The island is separated from Mangola by Lisamatula strait, a narrow channel in which there are several islets; heavy tide-rips were seen in this channel, which is said to be only navigable by boats. Along the north and north-east sides of the island are white cliffs, which are visible at a considerable distance. Off the north-east point a reef projects, with a rock above water. At the eastern extremity there is an inlet penetrating about a mile, divided into two arms by a low tongue of sand covered by bushes and bordered by reef to the distance of a cable; the depth of water at the edge of the reef falls rapidly to 35 fathoms. The *Flying Fish* anchored off this reef while fixing the position of the eastern point of the island, but no safe anchorage was found, and by the appearance of the shore a heavy sea must sometimes set in.

The eastern point of Lisamatula consists of Tertiary fossiliferous limestone, somewhat underworn by the action of the sea; it is surmounted by a hill 340 feet high, and was determined to be in lat. 1° 48½′ S., long. 126° 28¾′ E. There are no dangers off it; the bottom slopes gradually to a depth of 40 fathoms at the distance of one mile, and 135 fathoms at 2 miles. A very strong tide-race makes off the point, the flood tide setting to the south, the ebb to the north. A small saddle-topped islet, about 250 feet high, lies S.S.W. of the point.

General charts 942a, 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Sula Besi, the southernmost island, is of considerable height, especially in the north and south, the northern peak being 1,644 and the southern 1,855 feet high, and is visible at a distance of 40 miles, presenting an appearance of two islands when thus seen from east or west. Northward of Sannana is a conspicuous light-green and red patch, visible a considerable distance from the eastward. The island is well inhabited and cultivated, producing wax, honey, and rice. It is the most important island of the group; the principal place is Sannana, on the north-east coast, the head-quarters of a Posthouder.

Plan of Sannana bay on 930.

Sannana bay (*Lat. 2° 3′ S., Long. 125° 58′ E.*).—On the north-east coast there is a small indentation called Sannana bay, about 2 cables wide in the middle between the reefs, where there is good anchorage in a depth of 10 fathoms. The entrance is nearly closed by reefs from both sides, which leave only a narrow passage half a cable wide; the small old fort at the head of the bay bearing N. 75° W., will lead through this passage. The greater part of the reefs dry at low water, and the edges on both sides are marked by beacons. The beacon on the north side of the entrance has a white ball and lies N. 69° E., nearly 4½ cables from the little mosque; the beacon on the south side has a black truncated cone and lies N. 78° E. 3¾ cables from the same building. The bay is not easy to enter on account of the streams setting across the entrance.

The rise of the tide at springs is 9 feet.

Trade.—The exports are rice, sago, dried meat, wax, birds' nests, trepang, and turtle. The imports are chiefly cotton goods, arms, Chinese earthenware, salt, and haberdashery.

Communication.—Vessels of the Royal Netherlands Steam Packet Company visit Sannana every eight weeks on the outward voyage to North New Guinea, and in the middle of the intervening period on the return voyage.

Channel between Sula Besi and Mangola.—The northern part of Sula Besi is bordered by a reef, extending two-thirds of the way across the channel about 2 miles wide between it and Mangola, at which distance the depth is 1½ fathoms. Currents run at the rate of 3 to 4 knots in the channel, and the eddy winds from the high land make it inadvisable for a sailing vessel to take this passage. A depth of 7 fathoms can be carried through the channel.

Directions.—From the eastward bring Tanjong Ipa Pone in line with the north side of Kada Fota island, and steer towards it; pass the point at a distance of a little more than 1½ cables, and when Alifola

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

village is about abeam steer W.S.W. to pass southward of Nguki Sey, guided by bearings of Sangnea Mano and Fajao Pon.

From the westward, and having passed Nguki Sey, close the Mangola shore, and allow the land eastward of Tanjong Ipa Pone to disappear behind that point; give Tanjong Ipa Pone a berth of a little more than 1½ cables, at which distance the depth is 40 fathoms.

Charts 942a, b.

GILLOLO PASSAGE.—The Gillolo passage, formed between Gillolo island and the islands lying westward of Waigiu, is separated into two channels by Gebi island, which lies across nearly in the middle. The western channel between Gillolo and Gebi is that generally known by the name of Gillolo passage, and is preferable to the eastern passage. A chain of islands, stretching from Ombi Major to Kofiau, separates Gillolo passage from Pitt passage, and the channels between these islands are all held to be safe. That between Tubalai and Kikik, being wide, is generally preferred in the north-west monsoon; for the other wide channel, between Pulo Pisang and the Bu islands, is at that season too far to leeward for sailing vessels, but it may be adopted by ships coming from the northward during the south-east monsoon; *see* McCluer bank, page 106.

Chart 943, Philippine islands. Var. 2° 10′ E.

Rau island (*Lat. 2° 22′ N., Long. 128° 12′ E.*), lying 10 miles north-eastward of the north-east point of Gillolo, and separated from Morotai by Rau strait, has a high conical mountain on it, which descends steeply to the sea on the eastern side and slopes gradually to the north-west, on which side, along the beach, there is a plain three-quarters of a mile broad. The only village is Aru, on the north-east coast, in the neighbourhood of which is a grotto where edible birds' nests are found. There are two temporary settlements on the west coast. Numerous small streams afford drinking water. Off the north point of the island is a rock above water, and off the south end is Saminja mau islet, the passage between being narrow, but deep. From a point abreast Aru village a reef extends half a mile eastward, and from the south part of the island a reef extends 1¾ miles east-north-eastward into Rau strait.

Chart 1263, China sea.

MOROTAI ISLAND (Morti), lying 13 miles eastward of the north-eastern point of Gillolo, is about 48 miles long north-north-east and south-south-west and 11½ to 23 miles broad, and is high for the greatest part. The highest point is estimated to have a height of about 2,950 feet, and is one of the summits of the Sabatai range, which

Chart 1263, China sea. Var. 2° 10′ E.

stretches across the island from Tanjong Dena, the south-eastern extreme, in the direction of Tanjong Girongu. From Tanjong Dena the mountain chain rises regularly, at Tanjong Girongu it breaks off abruptly, forming a rocky mass nearly 100 feet high. The numerous rivers in the island are navigable by boats for some distance inland. On the river banks and on the flat south-western part of the island are forests of sago trees, and in the interior are dammar forests.

The island is frequented by people from Galela and Tobelo, who collect dammar gum and also fish among the islands off the west coast. Along the coast are many villages. The part of the island northward of a line drawn between Tanjongs Wajabula and Selepia is subordinate to the Sengaji of Galela; the part southward of that line being subordinate to the Sengaji of Tobelo. Beriberi is a prevalent disease in Morotai island.*

North coast.—On the north side of Morotai the coast forms a bay 3½ miles deep between Tanjong Sopi and Tanjong Padangi, about 8 miles apart; on the shore are two villages, the larger of which is named Sopi Kechil; behind the beach is a lagoon, and there is communication between the villages at ebb tide only.

In front of the bay and on a line joining the points is a small reef, with 5 fathoms least water.

There is anchorage in the bay in 7 fathoms, black sand, with Tanjong Sopi bearing N. 26° E. and Tanjong Padangi N. 82° W. Washing water may be procured from a spring about 275 yards from the beach.

West coast.—Tanjong Padangi (*Lat. 2° 38′ N., Long. 128° 24′ E.*), the north-west extreme of Morotai, is low and projecting. A reef extends off it, in which are some funnel-shaped holes, which being struck with force by the sea emit a whistling sound.

Chart 943, Philippine islands.

From Tanjong Padangi to Tanjong Wajabula, a distance of about 23 miles, the coast is very steep, and off Tanjongs Hapo and Boku a reef that partly dries, projects. Several villages lie along this coast; Hapo is a large village off which there is anchorage in 10 fathoms, and where very good water can be obtained. There is anchorage off Tio village in 9 fathoms, N. 52° W. from the mouth of the Tio river, the largest river on the north-west coast. Boats can enter the river at high water from April to September, and good fresh water can be had; the river swarms with crocodiles, however.

Tanjong Wajabula (*Lat. 2° 22′ N., Long. 128° 10′ E.*), the western extreme of the island, is conspicuous from a cocoanut plantation on it, and is surrounded by a reef which extends one cable westward and 2 cables southward. From the point to the village of the same name the coast is lined with cocoanut trees.

General charts 1263, 781.

Chart 943, Philippine islands. Var. 2° 10′ E.

There is anchorage off the village in 9 fathoms, with Saminja mau islet bearing N. 82° W. and Tanjong Wajabula N. 14° W. When bound for this anchorage, Saminja mau islet should be steered for, and when about 2 miles from it alter course to bring it to bear N. 82° W., and then to the anchorage with the islet astern, and nothing to the northward of the bearing given; the anchorage must be approached with caution, as the reef rises very steeply. There is also anchorage farther in, in an opening of the reef, with Tanjong Wajabula touching the east coast of Rau, and a house with a zinc roof bearing N. 40° E.

Wajabula is the shipping place for all the forest produce of the west coast of the island. The village is dirty, with small, mean houses; no good water can be obtained.

Off the Mohammedan village of Tilei, southward of Wajabula, there is anchorage in 9 fathoms, with the south-east point of Ngèle Ngèle besar bearing S. 51° W. and the north point S. 83° W.

The Polowo river, which discharges near Tanjong Pilowo, has formed a bank which extends out three-quarters of a mile, and on which the depth is 2 feet at low water.

Tanjong Gila (*Lat. 1° 58′ N., Long. 128° 15′ E.*), the south-west point of Morotai, is the extremity of a low, narrow tongue of land fringed by a narrow reef. Off the point is a coral island covered with cocoanut trees, named Mitita; in the channel between the depth is 5 fathoms, but in passing through it is necessary to keep under the point, as a large reef extends from Mitita. A reef with one fathom on it lies 2½ cables westward of Mitita, and a patch of 4 fathoms lies 1¼ miles west-south-west from the same island; also a reef with 2 fathoms on it lies 2½ miles north-west, and a shoal the position of which is doubtful, lies about 2½ miles west-north-west from the north point of Mitita.

Islets.—Off the west coast of Morotai, between Tilei village and Tanjong Gila, are a number of islets, some of which are wooded with cocoanut trees, and several are inhabited. Nowhere on these islets can good drinking water be obtained. The Ngèle Ngèle islets are the northernmost. The positions of the islets are sufficiently correctly charted for the purpose of navigation, but the bottom between them and the shore is very irregular, and the knowledge of the depths is still very incomplete. Navigation must be conducted with caution, and by sight of the discoloured water. While steaming from Tilei village to Tanjong Gila, reefs were passed over here and there which, by the discoloration, appeared to have little water over them, but the least depth found was 6 fathoms.

General charts 1263, 781.

Chart 1263, China sea. Var. 2° 10′ E.

East and south-east coasts.—On the northern part of the east coast the anchorage off Pangeo village is very unsafe. Lusuwo and Gorango bays offer anchorage for large vessels in 12 fathoms; there is a high, pointed coral rock near the north point of Lusuwo bay. Tanjong Gorango, 11½ miles south-eastward from the north point of the island, is surrounded by a reef that extends two-thirds of a mile eastward. At Tanjong Selepia, 6¾ miles south of Tanjong Gorango, a reef projects nearly 1½ miles eastward; northward of the point the coast is covered with mangroves.

Beri Beri road (*Lat. 2° 23′ N., Long. 128° 36′ E.*), sheltered by reefs and Tobailengi island, affords the best anchorage on the east coast of Morotai. On the western side of the bay are two conspicuous trees, the northern of which is the smaller. The village lies on the south-western side of a bay formed between Tanjongs Salé and Hohopu.

Large vessels may anchor in the bay in 14 fathoms, sand, a quarter of a mile from the shore, with the southern conspicuous tree bearing S.W. by W., quite sheltered except from swell and wind between south and south-east, or in 7 fathoms at 1½ cables from the shore; one cable north-eastward of this position there is a patch of 2½ fathoms. Outside 10 fathoms the bank is steep, but inside that depth the soundings decrease regularly to 5 fathoms near the shore.

There is an opening in the wide shore reef in front of the village, in a north and south direction, in which small vessels may find a safe and sheltered anchorage in from 4 to 6 fathoms, in a space over 1½ cables in diameter. A detached steep-to reef lies one cable eastward of the eastern entrance point of this opening.

On the south side of the village is a bamboo pier with sufficient depth of water at the outer end for steamboats.

Directions.—To enter Beri Beri road steer N. 8° W. between Tobailengi island and the shore until the northern and smaller of the two conspicuous trees previously mentioned bears West, when steer for it on that bearing, and anchor in from 14 to 7 fathoms, as previously directed.

To enter the opening in the reef near the village, steer West for the tree just mentioned until the opening bears South, when steer in on that course, but not farther in than to have the southern of the two trees bearing N. 34° W. The reef is well marked by breakers and discoloured water. Boats proceeding up this opening to the pier must avoid a detached reef lying farther in; there is a deep channel between it and the shore reef.

The entrance to the bay, between Tobailenga island and the large drying reef northward of it, is unsafe.

General chart 781.

Chart 1263, China sea. Var. 2° 10′ E.

Coast.—Jawo village, 4¾ miles south-westward of Beri Beri, is situated in a small bay surrounded by a ridge of dunes, behind which is a lagoon. The Lefau river entrance is indicated by a white sandbeach. From northward of Tanjong Boboro to Busu Busu, a reef lies parallel with the shore, with deep water between.

Busu Busu (*Lat. 2° 11′ N., Long. 128° 32′ E.*).—At Busu Busu the coast forms a small bay, where there is tolerably good anchorage in 16 fathoms, south-westward of the village, but it is not safe from October to March on account of the heavy swell. There is an opening in the reef just mentioned, near Tanjong Lefau, but it is advisable to approach Busu Busu anchorage from the southward, where there is a deep channel about 1½ cables wide between the shore reef and a detached reef to the eastward. Good drinking water may be obtained from a spring at the foot of the hills behind the missionary's house, but it is 3 cables inland; a stream in the north-west corner of the bay furnishes washing water.

Coast.—Between Wewemo and Mira villages there is good anchorage in the west monsoon, but reefs extend 1¼ miles from the shore. Mira and Sangowo are the two most populous villages in the island, and extend over a long distance; Mira has about 700 inhabitants. Sangowo lies close southward of the far projecting point of that name, which is 7 miles southward of Busu Busu; the Sangowo river has kept a channel open through the coral bank, through which large native craft enter. Near Sabatai village on the south coast, about 2½ miles westward of Tanjong Dena, the river of the same name discharges; it is navigable by boats far inland, and affords a good means of transport for forest produce.

Chart 943, Philippine islands.

Rau strait separates Rau and Morotai islands; the northern part is clear, but in the southern part the channel is contracted by reefs extending from the shore on both sides; it has not been surveyed, and is dangerous.

NORTH COAST of GILLOLO.—Between Tanjongs Bissoa and Jerre, the north-western and north-eastern extremes of the northern peninsula of Gillolo, the coast forms Suppu bay, in which is the village of the same name. A reef lies half a cable from the shore in front of the village, with deep water between, and forms a good breakwater. The bay is otherwise clear. There is anchorage N. 32° E. from the small river, with the east point of the bay bearing N. 70° E. and the west point N. 23° W. If intending to remain any time it is recommended to have a hawser fast to the shore.

General charts 1263, 781.

Plan of Galela road on 2772. Var. 2° 10′ E.

EAST COAST of GILLOLO. — Galela bay (*Lat. 1° 48′ N., Long. 127° 49′ E.*).—Galela village stands on the west side of this bay about 3 miles south of the mouth of the River Taliabu. The plain of Galela, in which at a short distance from the shore the lake of Galela is situated, is bounded on the sea side by two hills in the shape of truncated cones and a ridge 250 feet high, from which a hill 500 feet high rises. The highest of the two hills mentioned is Mount Tarakan, which is elevated 1,020 feet. The Lake of Galela is about 5½ miles long, and has a maximum depth of 26 fathoms. On the shores are several villages, among which, on the north side, is the Christian village of Duma, where a missionary resides. The mountain chain of Gillolo, north of Galela, has a high central part of about 1,300 feet, from which spurs approach the coast at Aru (just south of Tanjong Salimuli), Tanjong Saluta, and Tanjong Jerre.

The Taliabu river previously mentioned is navigable by boats; in front of the river is a bank which, in 1898, had a channel through it with 3½ feet least water. Inside, the channel is along the right bank; fresh water can be obtained.

In 1905 Galela village had 198 inhabitants, four of whom were Europeans.

Reef.—At about one mile north-eastward of Tanjong Salimuli is a reef with 2 fathoms least water.

Anchorage.—There is good anchorage during the south-east monsoon, in a depth of 26 fathoms very close to the shore, with the point on the eastern side of the road bearing N.E. by E. ½ E. In the north-west monsoon it is unsafe on account of the heavy swell; when the breakers are heaviest landing can be effected in the south-east corner of the bay.

In the south-east monsoon a fresh land wind blows at night, from W.S.W. to West, but now and then at night a malodorous vapour rises from the low land.

There is little tidal stream in the road. When approaching Galela bay, the flat-topped hills already mentioned, Mount Momoja, 1,969 feet high and conical, and a block of houses with zinc roofs which are seen when 8 miles distant, are conspicuous. Between Galela road and Tanjong Luari there is no anchorage.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route, call once a month at Galela, both on the outward and return voyages. *See* page 17.

Chart 943, Philippine islands.

Tanjong Luari, the south-east point of Galela bay, is a sloping spur of Mount Momoja, an old volcano, 1,969 feet high, wooded to the summit, which is split; at the foot of the mountain are hot springs. Near Tanjong Luari is a reef with 2 fathoms of water on it.

General charts 943, 1263.

Off-lying reefs.—A reef with a least depth of 2 fathoms on it lies 10 miles N. 50° E. from Tanjong Luari; it is about half a cable in extent. Another reef is charted about 3 miles east-north-eastward of the former reef.

Coast.—From Tanjong Luari to Upa village (*Lat. 1° 39′ N., Long. 128° 1′ E.*), situated westward of Kolorai island, the coast is flat and swampy in places, with mangroves; it is intersected by numerous small streams, and for the first 3 miles is bordered by a white sandbeach, fronted by black rocks which extend off some distance, after which the beach is of black sand, for about 12 miles, or as far as Efi Efi. From Upa to Kupa Kupa, about 3½ miles southward, the land near the coast is hilly; close northward of the latter place the mountain chain approaches close to the coast, and southward of it the land rises to a height of 200 feet, and then changes to the extensive plain of Kayu (Kaü); the beach here is again white sand. South-westward of Mount Momoja is a saddle-shaped volcano Dukono, the summits of which lie north and south; this volcano was active in 1901, when there were several earthquakes. Numerous small villages lie along the coast. The River Mede, abreast Mede island, the northernmost island under the coast, has a waterfall during heavy rains, which is visible from seaward. The action of the sea causes continual changes in the coastline, and the bays generally are becoming deeper. The River Gonga, south-westward of Miti island, is the boundary between Tobelo and the Kayu (Kaü) district.

Tobelo islands, situated south-eastward of Tanjong Luari, are low, flat, and covered with cocoanut trees. They are steep-to on the eastern side, but from the other sides reefs project. They extend over about 16 miles from north to south, and do not lie more than 4 miles from the coast. Toö huo, the northern islet, has a population of about 600, and Kokara lamo, 1½ miles to the south-eastward, is also well populated; Rarangane islet, between these two, is very low, and the inhabitants obtain their drinking water from the mainland. Pawole islet lies half a mile north-east of Kokara.

Tagaäja has a more floating population; at about 8 cables eastward of the north-east point is a reef which was observed to break at low water; Tupu Tupu islet, one mile southward of its south point, has a reef extending a considerable distance northward, but with deep water between it and Tagaäja. Kolorai island has a floating population who come to gather cocoanuts. Numerous small islets lie westward of the above islands and near the land. Miti, the southern island, is fairly well populated, and is separated from the shore by a channel only fit for boats. An islet and a wooded rock lie southward

Chart 943, Philippine islands. Var. 2° 10′ E.

of Miti, and on the northern side is a detached reef, distinguishable by the discoloured water. About one-third of a mile from the middle of the north-east side of Miti is a patch of 4½ fathoms; there is anchorage off this side of the island.

Anchorages.—The anchorage here is better than in Galela bay, as it is sheltered by the Tobelo islands. The anchorage is in 30 fathoms, northward of the steep-to reef, dry in places at low water, that connects Kumu island with the shore. A good berth is with Tupu in line with the north-east side of Kumu, and Tanjong Wosia in line with the west side of Kumu; this position is opposite a channel, marked by beacons, in the reef between Kumu and the shore, in which the depth is 2 fathoms at low water. Southward of Kumu is Ubo Ubo islet, a coral rock, with a reef 1½ cables N. 15° W. of it, on which the depth is 2 fathoms. Kumu is inhabited.

Since the distance from the above anchorage to Tobelo is great, vessels can anchor between Kumu and the village in about 6 fathoms. This anchorage may be reached by passing between Kumu and Ubo Ubo, avoiding the reef just mentioned, or between the Ubo Ubo and a drying reef south-westward of it. The reefs southward and eastward of Kumu are marked by beacons, not official.

Proceeding from Galela to Tobelo, after rounding Tanjong Lauri, steer in mid-channel between Toö huo island and the coast, and then towards Kumu.

Tobelo is the principal place in the Tobelo district, and consists of about 200 houses. The chief resides here, as does also the civil administrator when he is in the district. On the point opposite Ubo Ubo island is a shed belonging to the Royal Netherlands Steam Packet Company, and a landing pier. Well-shaded roads lead north and south from the village.

Communication.—Vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route, call at Tobelo every four weeks both on the outward and homeward voyages.

Charts 943, 942a.

Pediwang anchorage.—Pediwang village, lying just southward of Tanjong Tunuwai, is one of the largest in the Kayu district. From Tanjong Tunuwai a reef projects about one mile to the south-east. There is anchorage south-south-east of the village in 10 fathoms, hard sand, with Tanjong Pachikara, bearing S. 10° E. From Pediwang a footpath leads into the interior.

Bobale island (*Lat. 1° 22′ N., Long. 128° 6′ E.*), lying off Tanjong Pachikara at the entrance to Kayu bay, is low and densely

General chart 1263.

wooded; its inhabitants are known as excellent pearl divers. On the east side is a village, off which there is anchorage in 10 fathoms, sand and coral, at less than a cable from the shore. The passage between Bobale island and the shore westward has from 5 to 6 fathoms in it.

Chart 942a, Eastern archipelago, eastern portion.

Kayu (Kaü) bay.—Western side.—Kayu (Kaü) bay separates the northern from the north-eastern peninsula of Gillolo. The depths in the bay are generally not great. Between Tanjongs Pachikara and Biang the coast forms a bight, which is much encumbered with shoals, so that even native craft have difficulty in approaching the shore. Daro village lies at the head of the bight where the coast is flat, but between that village and Tanjong Biang the land is higher, and low spurs approach the beach and descend steeply to the sea. On this shore of the bight is Gamlaha village, where a missionary resides in a house with a zinc roof.

Between Tanjongs Biang and Boleo another bight is formed, on the north side of which is Walun village. Among the banks and reefs lying near the coast about here are the richest pearl banks of the Sultan of Ternate. Close northward of Tanjong Boleo is Kau village.

Kau (Kaü).—Anchorage.—Kau is the chief place of the district of that name; it is fronted by a gently sloping beach, outside which is a wide reef. There is anchorage in about 5 fathoms, mud, at a good mile from the shore with Tanjong Pachikara, bearing N. 35° E. The soundings off the place are irregular, the bottom consisting of ridges apparently running parallel with the shore. At Kusu Kusu, a mile north of Tanjong Boleo, recognised by a reed-covered plain, the reef extends far out. Light craft can approach the shore through a channel in the coast reef just opposite Diati village; this is the only means of access at low water, as the reef off Kaü is then dry.

A reef extends a mile off-shore for a distance of over 2 miles west of Tanjong Boleo, and dries in places.

Communication.—The vessels of the Royal Netherlands Steam Packet Company call every eight weeks at Kau (*Lat. 1° 12′ N., Long. 127° 56′ E.*), on the outward voyage to North New Guinea, and about the middle of the intervening period on the return voyage.

Coast.—Kaü river, the principal river of Gillolo, is formed by the confluence of the Tololiku and Tuguis rivers, and discharges by three mouths, the centre one of which is the most navigable. The river is navigable for native craft far inland.

Westward of Kaü river the coast is low for a few miles. with four villages on the beach, until it bends south-westward, where a ridge of

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 10′ E.

hills running east and west begins to send its spurs down to the coast. Near these steep heights is a bight named Laleo lamo, a safe lying-place for native craft. From a stream named Tabobo, just northward of Tawollas river, the coast consists of an alluvial plain, broken here and there by hills until it turns southward, when it is closely backed by a mountain chain, which rises to a height of 2,700 feet. This part of the coast is wooded with mangroves and nipa, and is fronted everywhere by a reef; some small villages are situated on the creeks.

Plan of Bobane bay, &c., on 2772.

Bobane bay (*Lat. 0° 53′ N., Long. 127° 41′ E.*) is an inlet at the head of Kayu bay (opposite Dodinga bay on the west coast), completely surrounded by high land. Kusu islet lies outside the entrance, which is 2 cables wide, with depths of 21 to 25 fathoms. There is anchorage on the western side of the bay in 12 fathoms, about 2 cables from the north shore, and the depths decrease regularly towards the land. In the eastern part of the bay, with Kusu islet bearing North, the depth is 12 fathoms, but farther eastward the bay is shoal, and can only be navigated by steamboats at high water.

South of the anchorage is the road to Dodinga, and a sandy beach where native boats are hauled up. About half a mile eastward of Bobane Igo village good drinking water can be obtained from a bamboo pipe by means of a hose from 50 to 60 yards long, but none can be loaded at low water.

Between Kau and Bobane bay no soundings were obtained with 10 fathoms of line.

Just eastward of Bobane bay is a small bight in which is Pasir Putih village. The house of the missionary is visible at a great distance, and the chart shows a flagstaff. There is anchorage north-east of the village in 15 fathoms.

Chart 942a, Eastern archipelago, eastern portion.

Kayu (Kaü) bay.—Eastern side.—Of the eastern side of Kayu bay little is known. From Tanjong Lolobato a reef extends one mile. At the head of Wasile bay there is anchorage in 18 fathoms.

Ake Salaka lies about 1½ miles northward of Roni island. There is anchorage in 13 fathoms at the southern entrance of the passage between the village and Babing island in front of it, which island forms a good mark for this road. Vessels must not pass between Babing island and the shore, but approach the anchorage from the south. About one mile north of Babing and about 4 cables from the shore is a reef, marked by a red buoy (not official). At Ake Salaka is an establishment of the Obi Gom Company. Good drinking water can be obtained.

General charts 942a, 1263.

Chart 942a, Eastern archipelago. Var. 2° 10′ E.

Communication.—Vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route from Amboina, call at Ake Salaka every four weeks, both on the outward and return voyages.

Plan of Ekor road on 2772.

Ekor road (*Lat. 0° 49′ N., Long. 127° 51′ E.*) affords anchorage in 12 fathoms, sand, at 6 cables from the shore, with the flagstaff bearing S. 8° W., and a white spot north-eastward of the village S. 76° E. The depths decrease regularly to the shore, off which a bank that dries for half its width extends 2 cables.

Chart 942a, Eastern archipelago, eastern portion.

Directions.—When entering Kayu bay, pass between Tanjong Lolobato and Bobale island, keeping towards the latter in about 7 fathoms to avoid a large reef lying in the middle of the passage.

Tanjong Salawai, or Leleei point, the north-eastern point of the north-east peninsula, has a reef off it, projecting 2 miles to seaward. The coast between Tanjong Lolobato and Tanjong Salawai appears to be safe with deep soundings off it.

From the cape the coast trends in a general southerly direction for about 28 miles to Tanjong Wagambi.

BULI or WOSSA BAY, lying between the north-eastern and south-eastern peninsulas of Gillolo, has numerous islets and rocks scattered in it. Tanjong Wagambi, the northern point of the bay, has a reef off it.

Plan of Bitjoli or Wossa road on 930.

Sandy (Ingelang) point, the southern entrance point, has a reef extending off it, and close westward are two islands, between which and the shore is a very narrow passage with 3½ fathoms in it; only vessels of light draught should use this passage. Reefs extend from both these islands.

Chart 942a, Eastern archipelago, eastern portion.

Islets and dangers.—North side of bay.—Gareel shoal, with a depth of one fathom, lies 11 miles S. 35° W. from Tanjong Wagambi, and 7 miles from the shore, as charted.

Krap or **Krab** is a sandbank lying 5 to 8 miles eastward of Buli village; discoloured water was seen northward and also westward of the bank.

Numerous shoals lie near the shore on the northern side of the bay, for which *see* the chart.

General charts 942a, 1263.

Plan of Bitjoli or Wossa road on 930. Var. 2° 10′ E.

South side of bay.—Otto island, lying 2 miles north-north-west of Sandy point, is surrounded by a reef which extends furthest towards the east and is steep-to; the channel southward of the island is deep and clear.

Pulo Wor, situated west of Otto island and north-north-west of Bitjoli, is surrounded by a reef which is widest on the north and west sides. The channel between Wor and Otto is clear, and also between Wor and the shore.

Wef Mia is an islet about 3 miles west-north-west of Wor, with a depth of 33 fathoms between, decreasing regularly to 9 and 10 fathoms near the islets. Close northward of Wef Mia lies a sandbank, and nearly 2 miles north-eastward from it is a large sandbank, the greater part of which is from 8 to 9 feet above water. About 2 miles south-westward of Wef Mia a large sandbank is charted, and it is stated that a dangerous reef lies 7 cables S.W. by S. from the islet. Between these islets and banks the depths are from 15 to 40 fathoms.

Wef Pluon, an islet about 4 miles N. by W. from Wor, is surrounded by a reef, and is uninhabited; the channel between is deep. Between Wef Pluon and Leleve islet, about 2 miles north-eastward, there is deep water; between Leleve and Wef Sain islet, situated about 3 miles north-westward, is a sandbank.

Para Para islet (*Lat. 0° 45′ N., Long. 128° 31′ E.*) lies N.W. by N. of Leleve, and near the middle of the bay; it is the northernmost of the islets hereabouts, and is distant about 10 miles from Bitjoli, the nearest point on the south shore. A drying sandbank lies northward and two drying reefs lie westward of the islet. A large reef, extending in an east-south-east and opposite direction, lies south-eastward of Para Para, the eastern end being about 5 miles east-south-east of the islet.

Gisi and **Pakal** are two islets lying near the shore on the west side of the bay. Between Pakal and Wef Sain and Para Para many dry reefs were seen. A rock awash is charted about 3 miles north-east of Pakal. There is a passage between these islands and between them and the shore. It is inadvisable to use that between Gisi and the shore, as the channel between that island and So islet is unsafe.

Chart 942a, Eastern archipelago, eastern portion.

Buli anchorage.—The village of Buli lies on the north-western part of Buli bay. There is anchorage off it in 14 fathoms, with So islet in Gisi strait bearing S. 19° E., and Para Para islet S. 73° E. The anchorage must be approached with caution, as there are several uncharted reefs. It is stated that there are three private beacons, marking reefs in the road.

General charts 942a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 10′ E.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route, call at Buli once in four weeks, both on the outward and return voyages.

Plan of Maba road on 912.

Maba road, in the south-west part of the bay, offers anchorage in a depth of 9 fathoms, mud, off the village, and north of the inhabited islet Maba, which is united to the coast by a reef. Water fit for washing can be obtained from a river here.

A more sheltered anchorage is to be found behind Tanjong Leupo in 10 fathoms.

Plan of Bitjoli or Wossa road on 930.

Bitjoli or Wossa road (*Lat. 0° 35′ N., Long. 127° 33′ E.*), on the south side of Buli bay, offers good anchorage in either monsoon. The village of Bitjoli stands on the shore about 10 miles west of Sandy point, the southern point of Buli bay. There are several islands off this part of the coast, which have already been mentioned.

The anchorage is between Pulo Wor and the village of Bitjoli on the mainland in a depth of 14 fathoms; care must be taken not to bring the west point of Wor to bear eastward of N.N.E. During the west monsoon it is better to lie closer under Wor island, which can be approached within 3 cables on the south side.

Directions.—Vessels from the southward bound for Bitjoli or Maba should pass between Otto island and the islands off Sandy point; those for Maba steer to pass half a mile southward of Wor and Wef Mia islets, avoiding the dangers south-westward of the latter. The depths from Otto island to Wor are from 15 to 20 fathoms, coarse sand, and mixed sand and coral. The passage northward of Otto island and between that and Wor is safe.

Charts 942a, b, Eastern archipelago, eastern portion.

The Shanpi or Sasi islands consist of two islands and an islet surrounded by a reef, lying about 6 miles from the east coast of Gillolo near Sandy point. They extend about 8 miles north-west and south-east; the northern one is the highest, the others are mostly level, and not very high. The channel between the islands and the coast is safe.

A shoal of sand and stones, covered by 10 fathoms water, is situated about 8 miles north-eastward of the northern Shanpi island, with Catherine island bearing E. ¼ S. A shoal, marked E.D., is charted 8 miles, N.N.W. ¾ W. of this position.

General charts 942a, 1263.

Plan of Gimia road on 912. Var. 2° 20′ E.

Gimia anchorage (*Lat. 0° 21′ N., Long. 128° 43′ E.*).—Gimia village lies about half-way between Sandy point and Tanjong Tabo. There is anchorage off the village in 10 fathoms at about 2 cables from the shore.

Charts 942a, b, Eastern archipelago, eastern portion.

Tanjong Tabo, the eastern extremity of Gillolo, has a gradual slope, ending in a bluff to seaward. The land hereabouts is high, and over the point a hill rises, like a quoin with its thick end to the westward. This hill has two remarkable white patches on it. Pulo Muor, about 1½ miles south-eastward of Tanjong Tabo, is a wooded island with small hills, the highest of which has an elevation of 591 feet. It is surrounded by a reef which is not more than one cable wide on the west side; close to the reef on this side are two steep rocks, between which and Tanjong Tabo is a passage with 65 fathoms of water. Close eastward of Pulo Muor, on the reef, there is a small islet named Ngollopoppo, which forms the western boundary of the passage between it and Gebi.

The eastern coast of Gillolo is well inhabited in many places, with small villages fronting the sea adjacent to Tanjong Tabo.

WEDA BAY, the great bay between the south-eastern and southern peninsulas of Gillolo, takes its name from a town on its western side, near the head. The east coast of the southern peninsula is mountainous.

A coral reef, 3 cables long in a north-west and south-east direction, and one cable wide, with a depth of 3 fathoms on it, lies with the north extreme of Pulo Muor bearing S. 89° E., distant 8½ miles, in line with the south extreme of the coast between. Several detached rocks and reefs lie off the northern coast of Weda bay, and in places at the distance of 2½ miles from the shore.

Plan of Gam Sungi road on 912.

Gam Sungi.—Anchorage.—Off Gam Sungi, 10 miles westward of Tanjong Tabo on the south side of the peninsula, there is anchorage in a depth of 20 fathoms, with the pier bearing N. by E. ⅜ E., distant one cable, or farther westward in about 25 fathoms, south-westward of the white house of the Posthouder, with the south point of Pulo Muor in line with the south extreme of Tanjong Tabo. The anchorage is bad. With southerly and easterly winds a heavy sea gets up, and soon stops all communication with the shore. The flood stream sets westward, the ebb eastward. The anchorage should be approached in the daytime, as the place is difficult to make out at night.

General charts 942a, 1263.

Plan of Gam Sungi road on 912. Var. 2° 20′ E.

A coral shoal, covered by 2 fathoms water, lies near the anchorage, with the east extreme of the bay bearing E. by N. ⅜ N., and the pier N. by W. ⅜ W., distant one cable. When approaching the anchorage keep the Posthouder's house eastward of North, to avoid this shoal. About 3 cables westward of this shoal and three-quarters of a cable from the shore is another reef with 2 fathoms on it, steep-to on the south side. A reef, marked by discoloured water, lies about 4 miles westward of Gam Sungi and about one mile off-shore.

The Posthouder, head of the subdivision of South and East Gillolo, resides at Gam Sungi; his house is white, surrounded by a white wall, and is conspicuous. In front of this house is a pier, which boats can go alongside. In 1911 the office of Posthouder was vacant.

Gam Sungi village (*Lat. 0° 14′ N., Long. 128° 44′ E.*), also called Patani, is a thriving place, and a great part of it consists of stone houses. The inhabitants, 1,096 in number in 1905, are mostly Mohammedans, who live by their trade in dammar, gum, copal, dried venison, and hides; there were only three Europeans.

Communication.—Vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route, call every four weeks at Gam Sungi, both on the outward and return voyages.

Tides.—The tide is mixed, partaking of a single-daily and double-daily character. If the moon's declination is 0° half a day before full or change, there is then a double-daily tide, especially in the second half of March and September; if the moon's half-monthly greatest declination falls half a day before the quarters, there is then a single-daily tide, particularly in the second half of June and December. The double-daily tide has springs 2 days after full and change, with high water at 6h. and a range of 2 feet; neap tides occur at the same interval after the quarters, with high water about mid-day and midnight, and a hardly perceptible range.

The single-daily tide has high water on 1st January at about 6h. p.m.; 1st April at mid-day; 1st July at 6h. a.m.; and 1st October at midnight; springs are 2½ days after the moon's half-monthly greatest declination, with a range of 1½ feet, and neaps at the same interval after the moon's declination is 0°, with a range of 6 inches.

In the second half of June and December these ranges increase to, respectively, 2 feet and one foot; in the second half of March and September that of springs decreases to over 2 feet, and that of neaps is imperceptible.

The high waters of both spring tides fall together about the beginning of July and the beginning of January, the highest level is then reached about 6h. a.m. and 6h. p.m.

The movement of the water is very slight when the moon's declina-

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

tion is 0° half a day before the quarters, and under these circumstances reaches the minimum in the second half of March and September.

Off Sagea, westward of Gam Sungi, there is anchorage in 32 fathoms, sand and coral, S. 12° E. from the mouth of a small river that boats can enter, and where good water may be had. In the south-east monsoon there are heavy breakers off the river entrance. Sagea mountain, recognisable by some white patches on it, bearing N.N.W., leads to the anchorage, passing close to a reef.

Plan of Weda road on 912.

Weda road.—There is anchorage in Weda road, about one cable outside the 5-fathoms line, in a depth of from 7 to 20 fathoms (the bottom shelving very quickly), with the flagstaff at Weda village bearing N.W. ½ W., distant 4 cables, and the south-east extreme of Uga Yef island N.E. ¾ N. The shore reef extends out about 3 cables in front of the anchorage, and to the distance of 7 and 5½ cables respectively close to the northward and southward of the above position. The southernmost of three reefs southward of Uga Yef, and the reef lying south-westward of that island nearer the shore are marked by buoys (not official). Seamew reef is a danger lying with the south-east extreme of Uga Yef bearing about N.W. by W., distant 5 cables. Saleti islet, about 5 miles south-eastward of Weda, lies near the shore, and is covered with high bakau trees.

In the approach to Weda road, and off the coast for a distance of about 12 miles to the southward of it, there are many reefs and shoals, which are a danger to navigation, extending out 4 to 7 miles from the shore. *See* the chart. Particular attention is therefore required when approaching Weda road.

Communication.—Vessels of the Royal Netherlands Steam Packet Company, on the North New Guinea route, call at Weda every four weeks, both on the outward and return voyages.

Plan of Foja anchorage on 2772.

Foja anchorage (*Lat. 0° 5′ N., Long. 127° 54′ E.*) is situated about 13 miles southward of Weda road, and off the village of Foja. The anchorage in 19 fathoms is about 7 cables N.E. of the village, and about 1¾ cables from two reefs lying north-westward and south-westward.

Chart 942a, Eastern archipelago, eastern portion.

Pulo Sunam, about 33 miles north-north-westward of the southern extreme of Gillolo and 3 miles off-shore is a tolerably high wooded island which shows up dark against the land behind it. A smaller island lies between Sunam and the shore.

Weda islands are low and wooded, and form two compact groups. The outer island of the eastern group bears about N.N.E. ½ E.

from the south point of Gillolo, distant about 18 miles, and is the highest of that group, having an elevation of 182 feet. Farewell island stands by itself, 1½ miles southward of this group, and is 162 feet high. The western smaller group lies west-north-west of the eastern group. They seem to be safe to approach in daylight, though very steep-to; at night they are difficult to distinguish. The *Marchesa* tried for anchorage among them, but found none. The channel between these islands and Pulo Sunam is not recommended at night.

Veldman rock, 7 miles northward of the eastern group, is of small extent with deep water close to it. The least depth of water found on it was 2 fathoms, but there might be less; from near the shallow part the eastern end of the easternmost Weda island bears S.S.E. ½ E., distant 10½ miles. Sailing vessels working to the northward should not bring the easternmost Weda island to bear eastward of South, as long as it is in sight.

The south point of Gillolo, and the islands and reefs off it, have already been described. *See* page 64.

Charts 942a, b, Eastern archipelago, eastern portion.

DANGERS NORTH of GILLOLO PASSAGE.—

Canton packet shoal, lying north-eastward of the Shanpi islands, is described as being of white sand and black rock, with the sea breaking in one place on what appeared to be a rock near the surface. From a position in a depth of 9 fathoms near this shoal, Tanjong Tabo (probably the hill over the cape, distant 26 miles) bore S. by W., and Catherine island N.E. by E. ¾ E.

Recovery rock is described as a white rock with a little vegetation on the top, lying 7 miles west-south-westward from the Catherine islands.

Catherine islands (*Lat. 0° 39′ N., Long. 129° 6′ E.*), lying N. by E. ¼ E., about 29 miles from Pulo Muor, consist of a tolerably large, low, and wooded island, visible 16 miles off by day and having close eastward of it a wooded rock with two hummocks on it, the eastern and higher of which is about the same height as the island. A bare, rocky islet, lower than the large one, lies a short distance north-westward of the latter. On the east end of the large island is a small sandy cove; the islands are steep-to on the south side. Southward of the large island anchorage was found in 20 fathoms.

A shoal of 14 fathoms, sand and coral, lies about 7 miles S. 9° E. from Catherine islands.

Chart 942b, Eastern archipelago, eastern portion.

Aurora bank, with a depth over it of 1½ fathoms, is charted as lying E. by N. ½ N. 17 miles from the Catherine islands. It has been reported by a whaler that there is only 5 feet upon the bank in some parts.

Winchester bank was reported by Captain Winchester, of the *Coral Nymph*, who in December, 1865, saw rocks under the ship, and sounded in 12 fathoms; he was of opinion, however, that the depth was not more than 5 or 6 fathoms when the rocks were first seen. The position is shown on the chart in lat. 0° 45′ N., long. 129° 38′ E.

Ormsbee bank (*Lat. 0° 45′ N., Long. 130° 0′ E.*) was first discovered by Captain Ormsbee, of the American ship *Asia*, on 6th December, 1818, who struck 15 fathoms with Wiang island bearing S. ½ E.; at a short distance from the ship there appeared to be less water, but no breakers were seen, the sea being smooth; its charted position is N. by E. ¾ E. 26 miles from the north-east end of Pulo Saiang. In 1865 Captain Winchester, after discovering the Winchester bank, got a sounding of 10 fathoms at 16 miles eastward of the latter, but the depth appeared to be not more than 5 or 6 fathoms in the neighbourhood. In 1872 the captain of the *Chusan* obtained the depth of 7 fathoms with Pulo Saiang bearing S.S.W. 17 miles, marked P.D. on the chart; a bank to the north of the ship at the same time appeared to have much less water, and was probably the southern part of Ormsbee bank.

In 1878 the British barque *Fire Queen* obtained depths of 20 to 27 fathoms from a distance of 12 miles south-west of the charted position of Ormsbee bank, in a northerly direction, to abreast its north-western edge. The chart shows a sounding of 15 fathoms about 5 miles west-south-westward of the bank.

EAST SIDE of GILLOLO PASSAGE.—Gebi island, which lies at the middle of the northern part of the passage, is about 22 miles long north-west and south-east, and in general is less than 3½ miles wide, and is hilly for the greater part. The south-eastern part of the island is the highest; close to the south-east point is a round-topped hill 1,112 feet in height, north-westward of which is a broad ridge of a little less elevation. The centre part of the island is lower, but it again increases in height to 851 feet, from which it slopes north-westward, and in that part is about 100 feet high. The north coast is unapproachable in boats; the western part is stony and without water, and therefore uninhabited. There is a bay on the south coast with good anchorage. There is anchorage N.N.E. of Kotiapi, a village on the east side of Gebi, in 22 fathoms, half a cable from the shore; water for washing can be had here. View *e*, at page 80.

The population amounts to about 1,000, all Mohammedans. They are governed by a chief who lives at Kotiapi, and who is subject to the

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Sultan of Tidore. The inhabitants are very poor, and there is hardly any trade. Besides Kotiapi, there are four villages.

Plan of anchorage on S. side of Gebi island on 912.

Fau island (*Lat. 0° 8′ S., Long. 129° 24′ E.*), off the middle of the south-west side of Gebi, has a conical, flat hill on it, 394 feet high, and of a reddish colour; the island is separated from Gebi by a channel about a quarter of a mile wide, which forms a safe harbour, with depths of 7 to 12 fathoms. Off the western entrance is a detached reef, the north-eastern end of which dries and is easily seen. The channel lies between Gebi and this reef, for the passage between the reef and Fau is contracted by a reef extending from that island. By keeping from one to 2 cables from the Gebi shore, the detached reef is avoided. View *f*, at page 80.

Two reefs lie off the eastern approach to this anchorage; in 1899 they were reported as appearing to be of greater extent than shown on the plan. In the channel between them and Fau the least depth found was 3 fathoms. The plan shows anchorage between these reefs and the Gebi shore, in 15 to 20 fathoms, but much caution is required about here.

Water may be obtained from a rivulet on the Gebi shore opposite the north point of Fau island, and also from a creek east of the south point of Fau.

The U.S.S. *Alert* reported in 1877 that in the channel between Gebi and Fau islands, depths of 7 to 12 fathoms were obtained where formerly 10 to 16 fathoms existed; no good landing-place for ships' boats could be found in this channel, neither could water be obtained.

Plan of Port Fau on 912.

A creek, named Port Fau, penetrates Fau island to a distance of one mile from the northern side; at the time of its exploration in 1772 it was a third of a cable wide at the entrance and 4 fathoms deep, widening within to 2 cables, with a depth of 10 to 18 fathoms; there is no late information concerning this creek.

At Fau island springs rise 5 feet.

Chart 942b, Eastern archipelago, eastern portion.

Iyoi island, 5 miles from the north-east shore of Gebi island, is low, and surrounded by a reef. The channel between Iyoi and Gebi is clear. The islet Uta, close to the north end of Iyoi, is also low. Both islands are covered with cocoanut trees.

Gag island, lying 21 miles south-eastward from the southern end of Gebi, is about 7 miles long north and south and hilly, two of the hills having an elevation of about 1,141 feet; the north-west coast is steep and barren, the north coast is not

General charts 2759a, 1263.

so steep, and wooded. The chart shows some detached rocks off the south end of the island. The island is uninhabited; fishermen come there from time to time to provide themselves with sago and water. At the south-east end is a small bay, where there is anchorage in from 8 to 10 fathoms, and where good water can be obtained from a small river. There is a sandbank off the south-east coast, covered with 3 fathoms water, and about 5 cables in length north-west and south-east. The Netherlands steamer *Batavia* anchored close to this sandbank, with the south point of Gag island bearing W. ¼ S., and the east point N. ¾ E.

The channel between Gebi and Gag (*Lat. 0° 25′ S., Long. 129° 52′ E.*) islands is safe, and is sometimes taken by sailing vessels going outward, and may probably be advantageous to those coming towards Pitt passage during the south-east monsoon.

Jef-doif islands are a group of four islands, the northernmost of which, named Klaarbeek, lies about 16 miles S. by W. from Gag island, and is rocky and 340 feet high. Kommerrust, about 7 miles south-eastward of Klaarbeek, is 153 feet high. Schoterug and Vlaming, the south-western islands of the group, are 90 and 80 feet high respectively. The Netherlands vessel *Siboga* found depths of 15 to 20 fathoms within the group, and no indications of detached dangers were seen. A reef extends 1½ cables from the south-west point of Schoterug. Klaarbeek and Schoterug show up well at night. Views *a* and *b*, at page 104.

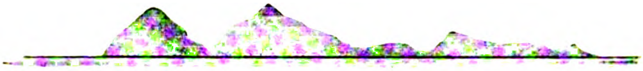
Bu islands, 57 miles S. by W. of Gebi island, form a group of seven small low islands and several little islets, connected together by a reef, which surrounds the whole group. Some of the islands are inhabited. Coral reefs extend along the south coast of them to a distance of 1½ to 2 miles, apparently with deep water between them and the islands. A reef, having a depth of one to 5 fathoms over it, extends 1½ miles in a south-east and east direction from the south-east point of Esplee or Popa, the eastern island; on the edge of this reef there is a depth of 12 to 14 fathoms. A reef is shown on the chart 3½ miles south of the western Bu island, with no bottom at the depth of 150 fathoms at its southern edge, but there is no information as to whether this reef is connected with the island reef.

Between the two western islands of the group there is a small bay, partly filled with reefs, but where shelter may be had from southerly and south-easterly winds, in 7 fathoms; it is not recommended with strong north-west winds. In the channel between Bu islands and Kofiau the *Alert* saw heavy tide-rips, which had the appearance of dangerous shoals, but no reefs were found.

General charts 2759a, 1263.

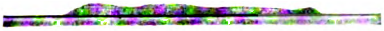
To face page 104.]

(a)



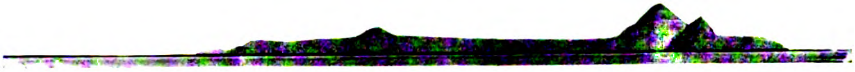
Klaarbeek island, S.E. ¼ E. 13 m.

(b)



Kommerrust island, S.S.W. 13 m.

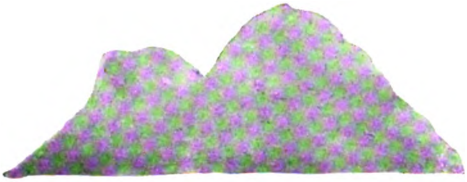
(c)



S. 53° W.
Round hill, W.S.W.

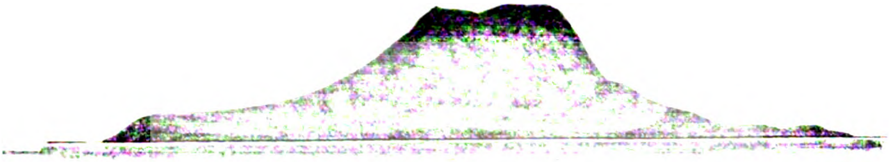
Kofiau island from the east-north-east.

(d)



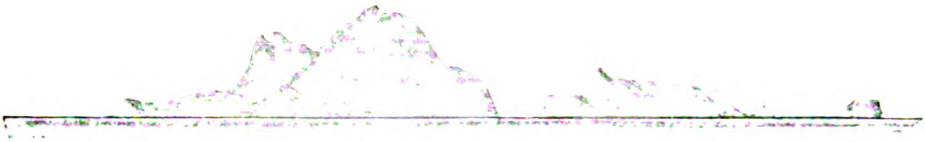
Pulo Pisang, S.E. by S. 20 m.

(e)



Kikik island, S. 28° E. 14 m.

(f)



Lawin islands from the north-west.

Plan of anchorage on E. side of Esplee island on 912. Var. 2° 30′ E.

Anchorage (*Lat. 1° 10′ S., Long. 129° 25′ E.*).—There is anchorage, exposed to northerly and north-easterly winds, on the eastern side of Esplee island, in a depth of 10 to 13 fathoms, at the distance of 4 to 8 cables from the shore.

When approaching this anchorage from the eastward, the south-east point of the island should not be brought to bear westward of W.S.W.

Chart 942b, Eastern archipelago, eastern portion.

Grosvenor and Dona Carmelita banks.—The Grosvenor bank is placed on the chart 8½ miles S. 16° E. of the south end of Esplee (the easternmost Bu island), but its position is doubtful. The *Castlereagh* struck in 1817 on a reef bearing South from Esplee, and in 1826 the *Dona Carmelita* passed on the northern side of a bank which is charted S. 15° W., 6 miles from the south end of Esplee island; on the north side of the bank there appeared to be a depth of only 3 to 6 feet of water. It is probable that the above dangers are one and the same shoal.

Kofiau island, lying eastward of the Bu islands, is about 18 miles long east and west, and 6 miles in general breadth. It is low for the greatest part, but has two remarkable hills on the north side near the centre, which can be seen at a great distance; the western one of semicircular form like a bee-hive and 851 feet high, the other of oblong shape and 591 feet high. View *c*, at page 104.

Westward of these hills the island is low, but farther west becomes hilly again, with a height of from 200 to 300 feet. On the north side, near the shore, is Deer island, together with a number of small islets. Good anchorage was found near these islets in 17 fathoms, coral, with the north point of the easternmost islet bearing N. 75° E. The depths decreased gradually to the shore, but quickly seawards. On the north side, west of Deer island, are four villages, otherwise the island is uninhabited. It is frequented by people from other islands for sago, trepang, and turtle.

Plan of Laat bay on 912.

Laat or Suriname bay, westward of Tanjong Laat, on the south-east side, is 4 cables long north and south, 2½ cables wide, and has anchorage in a depth of 17 to 22 fathoms in the middle.

There is a white sand-patch on the west side of the entrance, and just southward of it a reef extends eastward 1¼ cables, reducing the width of the entrance to 1⅔ cables.

Chart 942b, Eastern archipelago, eastern portion.

The group of islands off the south-west part of Kofiau island numbers about 30; the depth between them is very irregular. Here and there a bank of sand and coral is found. There is anchorage in many places.

General charts 942b, 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Caution.—The channel between Esplee island and the island off the west end of Kofiau is 15 miles wide; between the Grosvenor bank and the islets south-west of Kofiau the width is 10 miles. Vessels using this passage should give Esplee island a berth of at least 3 miles, and, as the neighbourhood of these islands has been only partially surveyed, great care is necessary when navigating this part of the Eastern archipelago.

Charts 942a, b, Eastern archipelago, eastern portion.

DANGERS in the SOUTH PART of GILLOLO PASSAGE.—Nabob shoal.—In 1845 the British ship *Nabob* passed over a coral reef 1½ miles long east and west, and 2 cables broad; the Bu islands bearing E. ¾ S., and Pulo Pisang South. The least water obtained was 3 fathoms.

Archvar shoal, or Dukes bank, composed of coral, extends in an east and west direction nearly 1¼ miles, with a breadth of about one cable, and has an estimated depth of 2 fathoms; it lies with the western Bu island bearing E. ¾ N., and Pulo Pisang South.

Pulo Pisang attains a height of 700 feet, and shows two peaks which can be distinguished at a distance of 27 miles. It rises abruptly from the sea without any beach; a small islet lies a quarter of a mile eastward of it, and to the westward are two rocks. View *d*, at page 104.

McCluer bank, about 2 miles in diameter, and marked P.D., is charted as lying 10 miles N.E. by E. ½ E. from Pisang, or nearly midway between it and the western extreme of the Bu islands. The existence of this bank is doubtful.

Chart 942a, Eastern archipelago, eastern portion.

Kikik island (*Lat. 1° 30′ S., Long. 128° 37′ E.*), lying about 14 miles east-north-eastward of Tubalai island, is high. **Lawin** island, about 4 miles eastward of Kikik, is also high, and has an islet off both its eastern and western sides; a coral reef extends one mile south-east from the islet on the east side of Lawin. Button islet is a small islet lying about 2½ miles north-eastward of Kikik. These islands are densely wooded, and have a sandy beach; Kikik and Lawin show up well at night. Views *e* and *f*, at page 104.

Bank.—There is a bank northward of Button islet, the extent of which, and depth of water over it, are unknown. In 1868 the American vessel *Brewster* anchored on this bank in a depth of 14 fathoms, with Button islet bearing S. by E. distant 3½ to 4 miles; at the same time another vessel anchored 3 miles eastward of the *Brewster* in 12 fathoms.

General charts 2579a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 40′ E.

Current.—In December, 1884, during a calm, the current was found setting across the above banks in an E.N.E. direction, at the rate of about 2½ miles an hour.

Chart 942b, Eastern archipelago, eastern portion.

MISOL, a large island 43 miles long and 20 miles broad at the eastern end, tapering towards the west, is but little known. The interior is inhabited by Alfur negroes, who are heathens, and the coast by a mixture of the negro and Malay races, who are Mohammedans; they are quiet and good-natured, and are estimated to be about 400 in number. The northern part of the island and the islands off that coast are flat, but the south part and the islands southward and south-eastward of it are high. Two of the hills in the southern part have an elevation of 1,772 and 1,309 feet respectively. The coast is generally rocky, and without a sandy beach. Only near the mouth of the Biga river on the south-east coast, just eastward of Lilinta village, is the ground swampy and covered with mangroves. A peninsula extends eastward from the south-eastern end of Misol, and consists of a long, narrow, and serrated mountain chain. Two deep inlets nearly separate this peninsula from Misol, leaving an isthmus about a quarter of a mile wide. The island is divided into two districts, Waigama or North Misol and South Misol; the first stretches along the north-west and south-west coasts, the latter along the south and east coasts, the dividing line running from Tanjong Jamtau, the north-east point of the island, to the small river We. The Biga river is half a cable wide at the mouth, but soon becomes narrow and shoal. There are three rivers on the north coast, which may be entered by boats at high water, and are then navigable for 3 or 4 miles. The shores are surrounded nearly on all sides by numberless small islands, the outermost of which to the north-west and eastward lie many miles off; those lying south-eastward of the peninsula at the south-east end of the island rise almost vertically from the sea.

Plan of Kasiem road on 912.

Anchorages.—Kasiem road (*Lat. 1° 46′ S., Long. 129° 58′ E.*).—On the north side of the island, Kasiem road offers anchorage in a depth of 8 fathoms at half a mile from the shore, with the village of Kasiem bearing about E. by S.

Plan of Katapu anchorage on 3440.

Katapu, situated on the south side of the islet of that name, about 8 miles westward of Kasiem, is the residence of the Rajah of Waigama, and consists of some 20 houses, most of which are built on the ground, but some above the water on piles. There is a mosque and also a flagstaff at Katapu. The drinking water, which is obtained

Plan of Katapu anchorage on 3440. Var. 2° 40′ E.

from wells, is brackish. Before the western entrance to the channel between Katapu and the coast of Misol is a reef with 3 fathoms on it, otherwise the depths in this passage are from 5 to 9 fathoms.

There is anchorage at 4½ cables west-north-west of Katapu and 4 cables from the shore of Misol in 9 or 10 fathoms, or somewhat nearer the island.

There is also anchorage in about 15 fathoms half a mile off-shore and the same distance north-eastward of Nusa Pial, an islet over 1½ miles westward of Katapu.

Plan of Efbe anchorage on 912.

Efbe anchorage (*Lat. 2° 5′ S., Long. 130° 8′ E.*).—On the south side of the island is Efbe anchorage, visited by Captain Forrest in 1775. The channel to this latter anchorage, westward of Efbe island, was partly examined by the *Marchesa* in 1883. Between the coral reefs extending from West channel island and those extending from Efbe, the entrance is about 1¾ cables wide, with depths of from 4 to 5 fathoms, deepening inside to 13 and 15 fathoms. There is anchorage in about 13 fathoms at one cable northward of the village on Cocoanut point, the north-west extreme of Efbe island. The channel eastward of Efbe island has not been examined.

Chart 942b, Eastern archipelago, eastern portion.

Lilinta, about 7 miles eastward of Efbe, is a village built on both sides of a narrow tongue of land connected with the island by an isolated hill, used as a burial place. The houses, some 15 in number, are mostly on piles. The Rajah of South Misol resides here. The inhabitants gather shells and trepang on the neighbouring shoals; strangers visit the place to cut gofasa, a wood used for building vessels.

There is anchorage off Lilinta in 20 fathoms, mud and gravel, with the highest point of Mati island bearing S. 66° E., and the point of Lilinta N. 41° E.

At Lilinta, an extensive reef, dry at low water, fronts the shore; on the western part of it are four low rocks covered with vegetation, inside of which is a passage for boats. Westward of these rocks moderate depths were found near the coast, and there is good anchorage for small vessels.

Directions.—The following route was followed by the *Siboga* when approaching Lilinta from the south-eastward. Billok islet, with two hills on it, the western of which is 285 feet high, lying about 14 miles south-eastward of Lilinta, was steered for on a N.W. bearing, and passed on its south-west side at a distance of 3 cables, when a north-

north-westerly course was steered to pass westward of Mati, an islet 360 feet high. The passage westward of Mati is several hundred yards wide, and has on its eastern side a small rock lying half a cable westward of Mati, and on its western side a number of rocks with vegetation on them. In this passage no bottom was obtained with 13 fathoms.

The eastern peak of Billok, bearing S. 26° E., in line with the westernmost rock westward of Wajil island leads through the passage, on clearing which the summit of Mati was brought to bear S. 66° E., and, kept astern on that bearing, led to the anchorage.

When leaving the anchorage for the south-westward, the vessel passed between the islets southward of Efbe island and Waaf island, and thence south-eastward of John island, which has two hills, the western being 182 feet high; a low rock lies close to the western side of John island.

Eastward from the south-east point of Misol a range of islets and scattered rocks extends for 40 miles, terminating to the east in the False Pisangs and Daram island, 408 feet in height; *see* page 276, Chapter V.

Off the north coast of Misol are numerous islets and several sandbanks, only to be understood by reference to the chart, extending more than half-way across the channel between the island and Kofiau, leaving, however, a clear route 10 miles in width between the southernmost of the Kofiau islands and the northern position of Fitzmaurice shoal (see below), and leading towards Pitt strait. The northern of these off-lying islands north of Misol is Tuilu, of the Nusela group, and lies N. 18° W. 20 miles from the north-east point of Misol.

The Kanari islands (*Lat. 1° 47′ S., Long. 129° 38′ E.*) lie to the north-west of Misol, and form an extensive chain of flat, wooded, uninhabited islands, leaving a narrow passage between some of the groups which lie close to Misol. Captain Forrest, on his voyage to New Guinea in 1775 in search of the nutmeg tree, visited Great Kanari, the largest and westernmost of these islands, and found good water in a pond situated on the south end. He anchored in Round harbour, so called by him, lying between two small islands which are at a short distance on the east side.

No known dangers exist in the passage between Great Kanari and Misol.

Fitz Maurice shoal, a rocky shoal with less than 12 feet water over it, reported by the British ship *Fitzmaurice* in 1866, has two positions assigned to it on the chart, one with the north extreme of Great Kanari bearing S.W. ¼ S., distant about 11 miles: and the other

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

position at about 12 miles from Great Kanari island, with its north extreme bearing S. by W.

Reefs are also charted in the vicinity of Baru island, situated about 8 miles north-eastward of Great Kanari; one, on which the estimated depth is 2 fathoms, lies about 3 miles west-north-westward of Baru, another about a mile southward, and a third about 3 miles east of the south end of the island. The first of these lies about 3 miles south-westward of the south-eastern position assigned to Fitz Maurice shoal.

Charts 942a, b, Eastern archipelago, eastern portion.

PITT PASSAGE, so named after the vessel of Captain Wilson (who first took this passage in 1758), but also named the Serang Sea, is the broad channel extending from Celébes island on the west, as far as the meridian of Misol to the east; it is bounded on the north by the Sula and Ombi islands and the chain of small islands stretching thence to Kofiau; on its south it is bounded by Buru and Ceram islands.

This passage forms the second Eastern Route to China for sailing vessels described in the China Sea Directory, Vol. III. (Vol. V., new series). A sailing vessel bound for China, arriving at the eastern straits in the months of December, January, or February, would find the route by Pitt passage and thence either by Pitt or Dampier strait or Gillolo passage into the Pacific, preferable to that by Makassar strait. This route would also be used by homeward-bound sailing vessels during the south-west monsoon in May, June, and July. The winds and currents in Pitt passage are very variable, and it may be crossed anywhere; it is, however, prudent to keep the weather shore when northerly winds prevail.

In case of falling to leeward of the north-west point of Buru, every exertion should be made to pass it quickly. Instead of working to do this, it is better to run southward of the island, and pass into Pitt strait to the eastward of it. During the north-west monsoon vessels which leave Amboina make to the northward along the east coast of Buru, where the winds are variable and squalls come off the land, and where the currents are rarely strong and are sometimes favourable for the run northwards; while beyond Manipa and the channel that separates it from Ceram, southerly currents prevail in this season.

Chart 942a, Eastern archipelago, eastern portion.

Danger.—Talbot reef (*Lat. 2° 8′ S., Long. 128° 11′ E.*), the position of which is doubtful, lies S. 21° W., distant 34 miles from the eastern end of Tubalai island, as charted.

The master of the ship *Talbot* reported in 1872 (*see* Mercantile Marine Magazine, 1873, page 303) that his vessel grounded on and passed over a reef in lat. 1° 51½′ S., long. 128° 8′ E., with the east side

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

of Tubalai island bearing N.N.E. and High Peak on Gomumu island W.N.W., where the latest charts mark no bottom at 70 fathoms.

No soundings were obtained, and there was no discoloration of the water. The position by bearings does not agree with the latitude and longitude given by the master of the vessel, but nearly agrees with the charted position.

BURU ISLAND, the third largest of the Moluccas, is 78 miles long, east and west, and 48 miles broad. It is exceedingly mountainous, especially in the north-west part, where Mount Tomahu (*Lat. 3° 15′ S., Long. 126° 4′ E.*), the highest in the Moluccas, rises to 8,524 feet above the sea. Kaku Siel, 16 miles eastward of Tomahu, is not much lower, while Batu Bua, in the south-east part, is 4,626 feet in height.

Northward of Batu Bua and south-eastward of Kayeli bay are two conical peaks named Mother and Daughter, the former being 1,700 feet high and the higher of the two. Outside Kayeli bay both are visible, but inside only the Mother is seen, which is the case also from other directions.

From the westward the summit of Tomahu appears nearly conical, but seen from the northward it appears more level, very like the summit of Kaku Siel; at a great distance one may be mistaken for the other. View *a*, at page 118.

A large lake, Wakaholo, lies at the eastern foot of Kaku Siel, at the height of 2,460 feet above the sea; rivers from this lake flow to both the northern and southern shores.

The coast is in general bordered by a reef with deep water close to, and, with the exception of Kayeli bay on the north-east coast, affords no sheltered anchorage for large craft. The small native coasters find anchorage in the openings at the mouths of rivers, of which there are some twenty on the south coast, and four or five on the north coast; the west coast also offers good anchorages. The mouths of all the rivers are obstructed by bars. Temporary anchorage for ocean-going vessels may be had at Bara bay on the north coast, at Uki road on the south coast, and also at Pela and Ilat on the east coast.

Buru is under the Residency of Amboina, and is divided into two districts, Kayeli and Masaretai, the former under a Civil administrator and the latter under a Posthouder. The population of Buru is about 10,000, mostly heathen, with a part Mohammedan and about 1,500 Christians. The heathen inhabitants, Alfurs, live mostly in the forests of the interior, and are described as simple and peaceful people; they support themselves by collecting the forest produce, principally sago, dammar, and timber, also by hunting and a faulty kind of agriculture. The rest of the inhabitants live on the coast, and are engaged in trade, hunting, fishing, and gardening.

General charts 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 20′ E.

Winds and Weather.—Buru is within the influence of the south-east and north-west monsoons; there is a regular wet and dry season, which varies on the northern and southern coasts. On the north coast the north-west monsoon brings rain, and the south-east monsoon dry weather; whilst on the south coast the south-east monsoon brings rain simultaneously with the rainy season at Amboina. The south-east monsoon lasts longer and brings more rain with it than the north-western, so that the rivers on the north coast, as well as those on the south, are swollen during that season. The climate is exceedingly moist, and reported to be unhealthy.

West coast.—Tanjong Palpito, the north-western extreme of the island, has a reef projecting about 4 cables from it, on which is a rock dry at low water; the reef is steep-to. The coast trends in a southerly direction from this point for 24 miles to Tanjong Sarmena, and can be approached with safety to within a short distance, the coast dangers being indicated by the discoloration of the water.

The three Tomahu islands lie just off the shore, and are high, cliffy islands, densely wooded for the most part. In the passage between Buru and the two northerly islands there are from 6 to 19 fathoms of water, but the passage is obstructed at the north end by a reef, with some rocks above water. On the east side of Tomahu and Tengah there is no reef.

Fogi, the southern island, has a remarkable peak, visible from a considerable distance; a very narrow passage separates it from Buru.

A rock with 2 feet water on it lies about 2 miles southward of Fogi island, at the distance of about one mile from Tanjong Suwalabi, on the Buru shore; a sandbank that dries over a distance of half a cable extends off the point.

Fogi village, the principal one on the coast, is situated at the mouth of the river Nitu, nearly opposite Fogi island.

Anchorage (*Lat. 3° 16′ S., Long. 126° 0′ E.*).—There is anchorage inside Tengah, the middle Tomahu island, eastward of the village on its north-east point, in a depth of 17 fathoms; the approach is southward of the island. Steer in N. 59° E. for a broad white sand-patch on the shore of Buru, and pass about 4 cables south of Tengah, leaving on the starboard hand a reef covered by 1½ fathoms lying off the southern island. Having passed the south point of Tengah, steer more northerly for the anchorage, keeping midway between the island and the Buru coast. Further south, off the village of Fogi, there are many outlying dangers, and the anchorage is a considerable distance from the shore.

General charts 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

North coast.—The north coast of Buru presents from the sea an uninterrupted line of forest close along the shore, with a ridge of hills at a short distance inland and higher mountains behind. There are no dangers except off the points, where reefs extend generally to a distance of about 2 cables. The points are all low, with the exception of that at the entrance of the Wai Nipeh, which flows from Wakaholo lake and is the principal river on this coast, and Tanjong Batu Noha, near the entrance of the Wai Putih river; the latter point is a cliff about 100 feet high, rising steeply from the sea, and is the northernmost point of Buru. Wai Nipeh river has a large sandbank off its entrance.

Plan of Bara bay on 911.

From Tanjong Palpito the coast trends east-south-eastward for 9 miles, and then turns north for about 2 miles, forming Bara bay, in which there are depths of 17 to 35 fathoms at half a mile from the shore, and upwards of 50 fathoms at one mile. The plan shows anchorage in a depth of 17 fathoms, nearly 2 miles from the head of the bay, and half a mile from the south shore. The small rivers that discharge into the bay afford good drinking water. The country on the west side of the bay is rich in ebony, and the whole coast westward to Tomahu is uninhabited.

Tides and tidal streams.—It is high water, full and change, in Bara bay, at 2h., with a rise of about 6 feet. The flood stream sets westward and the ebb eastward.

Wai Mani village, formerly Lisela, lies at the mouth of a river about 15 miles eastward of Bara bay; reefs project from points eastward and westward of the mouth of the river.

Plan of Wei Pelau anchorage on 911.

Wei Pelau (Labuan Kora Kora), a small bay on the north-east coast, affords anchorage in a depth of about 25 fathoms, sand, at the distance of 2½ cables from the shore. A reef, which is steep-to, fringes the shore, and extends about 2 cables off in front of Wai Pelau Mati village, on the western side of the bay, but is very narrow on the south and south-east sides. Water can be obtained if necessary from the creek in the south-west corner of the bay.

Chart 942a, Eastern archipelago, eastern portion.

Jiko Marasa bocht (*Lat. 3° 12′ S., Long. 127° 3′ E.*), about 3 miles south-eastward of Wei Pelau anchorage, is open to winds between north-west and south-east, through north. The depths vary from 4 to 17 fathoms; a shoal of 3 fathoms lies with the Regent's house bearing S.W., distant about 4 cables. Vessels should anchor in from 8 to 10 fathoms, outside the shoal patches; the bottom will be visible

General charts 942a, 2759a, 1263.

under the vessel The south-west part of the bay is mostly occupied by native craft. The only landing place is at the village. A channel 33 feet wide near the village leads to an expanse of water a short distance inland, surrounded by gently-sloping hills about 700 feet in height; it is said to be from 5 to 8 fathoms deep, and to have many fish in it; in the channel a stream runs at the rate of from 3 to 4 knots an hour. A good road leads from the village to the north side of Kayeli bay.

This anchorage offers no advantages over Kayeli bay in the north-west monsoon; in the latter anchorage vessels lie quieter. In February, 1902, a flood stream was observed setting north-westward at about 2 knots an hour, but the ebb stream was hardly perceptible. Sometimes in the anchorage no stream was observed, but it appeared to be running outside.

Plan of Kayeli bay on 911.

KAYELI BAY, on the north-east coast of Buru, is about 4½ miles wide at the entrance between Tanjong Karbu or Lissaletta point to the northward, and Tanjong Ruba to the southward, and penetrates about 5 miles to the south-west; both points are bordered by reefs, and there are depths of 6 to 25 fathoms at half a mile from the northern point, but the reef off the southern point is steep-to, and the water is very deep on that side till near the inner shore of the bay. Part of the eastern shore of the bay is cliffy; the south and west shores are low. The south-west shore of the bay is fronted by a shoal extending 1½ miles off-shore, with a very steep edge, the water shoaling rapidly from 20 to 2 fathoms within a cable's length.

The south-eastern shore is fringed by coral reef to the distance of two-thirds of a mile, with 9 to 10 fathoms water at the edge; the reef dries at low water. A detached shoal with a depth of 1¼ fathoms over it lies off this coast reef, with the mouth of Kayeli river bearing S. 12° W., distant $1\frac{6}{10}$ miles. Wai Apu, which has its source in the Lumara hills to the southward, flows through a broad plain named the plain of Kayeli, and enters the north-west part of the bay; it is navigable for a considerable distance by small craft. Namalea village, with about 120 inhabitants, lies on the north side of the bay, and is connected with Jiko Marasa bocht by a good road. It is in a more healthy situation than Kayeli; the plain of Namalea is covered with cajaput trees. The northern part of Kayeli bay has not been surveyed.

LIGHT (*Lat. 3° 23′ S., Long. 127° 7′ E.*).—A *red fixed* light, elevated 23 feet above high water, and visible 8 miles in clear weather, *Plan of Kayeli bay on 911. Var. 2° 30′ E.*

is exhibited from a white framework, 20 feet high, situated on the eastern entrance point of the river at the town of Kayeli.

Anchorage.—In the south-east part of the bay there is a space about 1½ miles wide between the reefs of the south-eastern and south-western shores, where good anchorage can be had, sheltered in both monsoons. The water shoals gradually from a depth of 50 fathoms at the distance of 1½ miles from the shore at the head of the bay to 9 fathoms at about 2 cables from it. The best berth is in about 19 fathoms, with the fort bearing S.S.W., distant half a mile, and Red island, or Pulo Papua, E. by N.

There is sheltered anchorage off Namalea on the north side of the bay, in from 15 to 18 fathoms, with the village bearing N.N.E. and the point eastward of the village East. The bay in which the village is situated is full of small reefs, between which there is passage for light craft. With continued easterly winds there is a slight sea at the anchorage, but near the beach it is always smooth. Good water can be procured from wells, or by digging a short distance below the surface of the ground; there is no running water.

Plan of Inner harbour, Kayeli bay, on 911.

Eastward of Red island there is a small inner harbour, in which the depth is 6 fathoms; it is approached by a very narrow but deep entrance lying northward of the island. Small craft would find complete shelter here, but the anchorage space is very limited.

Land and sea breezes are generally regular; the land wind comes off about 5 or 6 p.m., and the sea breeze makes about 9 to 11 a.m.

Directions.—Steer in midway between the two entrance points until the north point bears North; then keeping it on that bearing steer South until the fort is distinguished. Vessels working under sail must give both points a wide berth. When nearing the anchorage several praus will generally be seen at anchor, to starboard. These praus lie in about 5 fathoms, and just outside there are 15 fathoms, while at low water a good part of the shore reef dries. It is therefore difficult to discharge at low water.

Kayeli town (*Lat. 3° 23′ S., Long. 127° 6′ E.*) is on the southern shore of the bay. It is controlled by a Civil administrator under the Amboina Residency, and most of the native Rajahs live here; there were 526 inhabitants in 1905. Fort Defence, an old work of 1778, is a conspicuous object, with massive embrasured walls standing in the middle of the village. The town was made a free port in 1854, but is not open to general commerce. The exports are cajuput oil and dried fish. The place is unhealthy.

There is no pier at Kayeli; in northerly winds there is nearly always a surf on the steep sandy beach abreast the anchorage.

General charts 942a, 2759a, 1263.

Plan of Kayeli bay on 911. Var. 2° 30′ E.

Rainfall.—The annual rainfall amounts to about 73 inches. September, October, and November are the driest months; during this period only about 6¾ inches of rain fall. December, January, February, March, and June are the wettest months. *See* page 324.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, employed on the North New Guinea route, call at Kayeli once in eight weeks, both on the outward and return voyages; the vessels on the West New Guinea route call on an average every four weeks, alternately on the outward and return voyages.

Tides.—It is high water, full and change, in Kayėli bay, at 1h. 32m., rise of tide 4½ feet.

Supplies.—Fresh provisions may be procured here, but are not plentiful; water of an indifferent quality can be obtained from a rivulet east of the fort.

Chart 942a, Eastern archipelago, eastern portion.

EAST COAST.—Eastward of Tanjong Ruba, Tanjong Kramat rises steeply from the sea; between it and Tanjong Pela farther to the eastward the coast is covered with mangroves, but beyond Tanjong Pela there is a gravel beach.

Tanjong Pela (*Lat. 3° 22′ S., Long. 127° 16′ E.*), the north-east point of Buru, can be passed close-to, and near it there is tolerably safe anchorage. Tanjong Rea, about 15 miles southward of Tanjong Pela, rises steeply from the sea; southward of it, in a plain, is Ilat village, in front of which it is said that anchorage may be found. Southward of Ilat is a conspicuous rock in the sea with two cocoanut trees on it. Between Ilat and Tanjong Saroma the coast is steep; at this point rocky masses, 200 feet high, form the coast, after which it becomes sandy, backed by a ridge of hills 800 feet high.

SOUTH-WEST COAST.—From Tanjong Sarmena, on the south-west coast of Buru, to Tanjong Lisatetu, a distance of about 13 miles south-eastward, the coast is high and wooded, with here and there a broad sand-beach where streams flow into the sea. Wai Limi river has a reef 2 cables wide off its entrance. Tanjong Lisatetu is surrounded by a reef which extends to a considerable distance. From Tanjong Lisatetu the coast trends south-eastward about 14 miles to Tifu bay, and is low, being the plain of Mala, so called from the river of that name that discharges about 9 miles from Tanjong Lisatetu. In the rainy season the sea water is discoloured to a considerable distance from the shore by the muddy water discharged from the river. A low spit is formed by alluvial deposit at the mouth of the river, with a bight on each side where small vessels can anchor.

General charts 942a, 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Reefs.—A reef, the existence of which is doubtful, is charted about 7 miles W. by S. from Tanjong Lisatetu; it has been searched for unsuccessfully, and is not known to the natives.

A reef is charted about 3 miles S.E. by S. from Tanjong Lisatetu and 1½ miles off-shore; discoloured water was seen in about this position.

Plan of Tifu bay on 3440.

Tifu bay (*Lat. 3° 44′ S., Long. 126° 25′ E.*) is a small port in the district of Masaretai on the south-west coast of Buru. It is surrounded by high land, and the entrance between two rocky points is only about one cable wide and 17 to 27 fathoms deep. The western and higher point is easily recognised from the westward, since immediately westward of a hill close to the point the plain of Mala begins. From the southward the bay shows as a patch of white sand beach between two rocky hills, with a higher light-green ridge with three summits in the background. Coming from the eastward Batu Kapal will be a guide to the bay.

The entrance channel runs northward about 1½ cables, within which the bay lies east-north-east and west-south-west about 4½ cables, with a width of about 1¾ cables; this space, however, is considerably reduced by steep-to reefs, which border the stores. An inner bay on the north side is filled with reefs, and on the east side of its entrance, on the drying reef, is Pulo Kechil, a small islet. The depth in the bay is from 6 to 8 fathoms. At the head of the bay, on the east side, is Masaretai, with 543 inhabitants in 1905, the principal village on the south coast of Buru, and the residence of the Posthouder for the Masaretai district. There is a boat pier with a white lantern on it.

Near the western entrance point is a white beacon, shaped like a pyramid, which can be seen 10 miles off. The bay itself is beaconed; on the projecting reefs of the outer and inner side lie respectively a white and black buoy, while on the 3-fathoms line several beacons are placed. These beacons and buoys are not official.

The anchorage is off the village in 7 or 8 fathoms, mud, with Pulo Kechil bearing N. 63° E.; vessels run a stern hawser out to that islet. There is no swell or sea at the anchorage.

When entering, the western rocky point and the beacon off the inner eastern point must be passed pretty closely, then steer north-eastward to the anchorage, passing a beacon on the edge of the reef on the north-west side of the bay. The streams outside the entrance set across. With a strong continuous south-east monsoon the entrance is dangerous. It is advisable to enter in the early morning, and to leave again as soon as possible, as the wind always increases in strength in the course of the day. A flag is shown on the eastern entrance point when it is considered unadvisable to enter on account of the heavy sea.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, employed on the West New Guinea route, call at Tifu bay from Makassar once in four weeks, both on the outward and return voyages, but the call will not be made if it is not considered advisable from a nautical point of view. In such a case the vessel may go to Kabat bay.

Chart 942a, Eastern archipelago, eastern portion.

Mepa bocht, eastward of Tifu bay, is a small shallow bay of no importance to navigation; it is surrounded by high green ridges, with a higher hill in the background, by which it may be recognised. Mepa hill, on the east side of the bay, is 1,000 feet high. A reef, dry at low water, lies in front of the bay parallel with the shore. Mepa village lies about 100 feet above the sea on a spur of the surrounding mountains; it has a small church. Behind the village the mountains rise with steep slopes to a height of 1,700 feet.

Kabat bay, about 9 miles south-eastward of Tifu bay, affords good anchorage in the south-east monsoon; it is surrounded by high land. Reefs extend from Tanjong Lusula on the west side in a north-west direction, and from Tanjong Kabat on the eastern side in a south-east direction. Three small islets lie on the reef off Tanjong Lusula, and one islet on that off Tanjong Kabat. In the middle of the bay is an islet with a flat top, which must be passed close to on the eastern side when entering. In the entrance to the bay the depth is 20 fathoms. At the head of the bay on the east side there is anchorage in 5 fathoms, mud; a small stream discharges here. Lusula (Leksula) village lies on the shore, its inhabitants are Christians, and there is a small church in the middle of the village. A steep mountain rises behind the village to a height of over 1,000 feet.

On the east side of Tanjong Kabat, close under the shore, are two rocky islets; eastward of the bay, and not far from the coast, is a high mountain with a sharp summit.

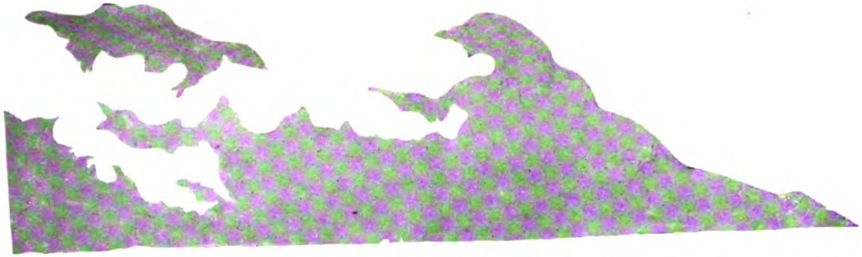
Reefs.—Westward of Kabat bay a long reef, with less than one fathom on it, lies parallel with the shore. Between Mepa bocht and Tanjong Lusula the shore should not be approached within a distance of 3 miles.

Batu Kapal (*Lat. 3° 50′ S., Long. 126° 34′ E.*), about 1½ miles eastward of Tanjong Kabat, consists of two pointed bare rocks in the sea, which in a north-east to east direction appear like a brig under full sail. They are visible 4 miles off.

Tanjong Batu Tulies is high and cliffy; close to it is a moun-

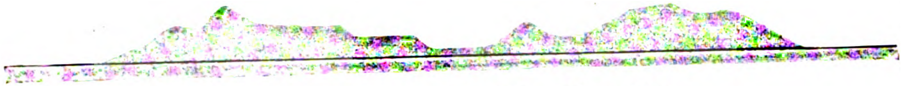
To face page 118.]

(a)


Dome, S.S.W., 40 m.

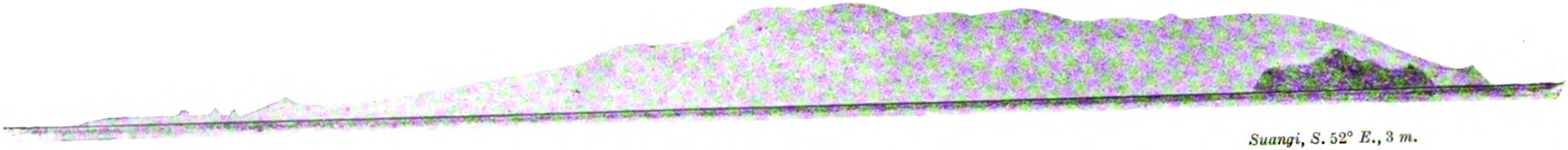
West extreme of Buru island.

(b)



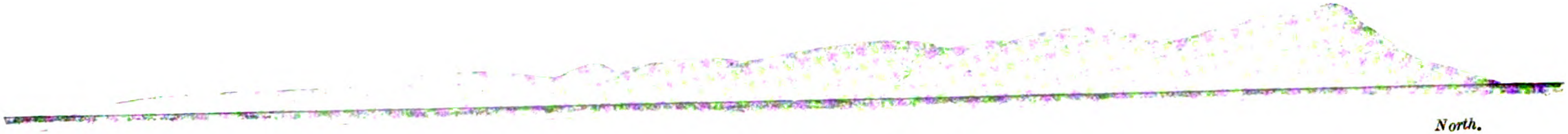
Amblau island, N. by W., 30 miles.

(c)


Suangi, S. 52° E., 3 m.

Manipa and Suangi islands.

(d)



Kelang island, N. by W. 26 m.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

tain from 4,000 to 5,000 feet in height. At 3 cables westward of this point is the eastern end of a reef, which lies parallel with the shore, and has from one to 5 fathoms over it; the western end of the reef lies southward of Batu Kapal.

Namrole bay and village lie westward of Tanjong Peka; native craft find an anchorage here in the south-east monsoon. The village stands on a narrow strip of ground with steep land behind it rising to a height of 1,000 feet.

Klasi islet, steep and cliffy, lies close westward of Tanjong Peka, the depth in the narrow channel between being 7 and 8 fathoms. Also westward of Tanjong Peka is a white coral bank above water, from which a reef extends 2 cables.

SOUTH-EAST COAST.—Tanjong Peka (*Lat. 3° 52′ S., Long. 126° 43′ E.*), the southernmost point of Buru, is composed of grey weather-beaten vertical cliffs, 170 feet high, with palm trees and undergrowth on the summit. At 3 cables eastward of the point is a reef 1½ cables long east and west, and farther eastward, between it and Uki island, a bank is charted.

Plan of Uki road on 911.

Uki or **Lota island** lies about 3½ miles eastward of Tanjong Peka, and one mile from the shore. It is high, steep, heavily timbered, and makes a good landmark; it is uninhabited. Wayo bank, with depths of from 3 to 5 fathoms, and very steep-to, lies about 1½ miles eastward of Uki island, with a deep channel between them; the bank also lies southward of Tanjong Salbatu, from which it is separated by a deep channel over half a mile wide.

Uki road, between Uki island and the shore affords anchorage anywhere in depths of from 6 to 20 fathoms. There is a patch of 5 fathoms in the centre of the road northward of the west side of Uki island. The anchorage recommended is in about 12 fathoms, N. by E. of the east point of Uki island and midway between it and Uki village; the latter is situated on the Buru shore north-north-eastward of the island, and on the east side of the entrance of the Wai Liki river. The river affords good drinking water, but only light boats can enter.

Chart 942a, Eastern archipelago, eastern portion.

Belobo bank, eastward of Tanjong Salbatu, is dry in places at low water; farther eastward, at about 5 miles from the point, a reef extends 4 cables from the shore.

Tanjong Salia or **Wamsisi,** about 8 miles east-north-eastward of Tanjong Salbatu, has Wamsisi village eastward of it, in a bight where native craft anchor in the west monsoon; steam vessels can run in here without danger, notwithstanding a large sandbank, dry at low water, that extends into the bay.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Lumara village, about midway between Tanjongs Salia and Saroma, some 18 miles apart, lies in a plain intersected by several streams, the largest of which, Wai Lumara is shallow and only fit for very light boats. In rear of the plain Lumara peak rises to a height of between 2,000 and 3,000 feet.

Amblau island, 10 miles southward from Tanjong Saroma, is 6 miles long east and west, and 2,060 feet high. The channel between it and Buru is quite safe, and is recommended for sailing vessels bound through Manipa strait from the southward during the north-west monsoon; during this season there are strong tide-rips in the passage. The island is infertile, not producing sufficient sago for the use of its inhabitants, who procure it from Buru. The population is about 800, all Mohammedans, and there are seven villages on the island. Off the village of Olima (*Lat. 3° 50′ S., Long. 127° 9′ E.*), on the north side of the island, a well-sheltered anchorage in the east monsoon was found in 25 fathoms, sand and stones, with the mosque bearing S.S.W. There is no other anchorage, and the island is steep-to except for small reefs that lie near the shore at Elara and Lemoi. View *b*, at page 118.

MANIPA STRAIT.—Between Manipa and Buru islands there is a good and safe passage, and one that is generally used by vessels from the Molucca passage to the Banda or Arafura sea. In the north-west monsoon the current appears to set northward on the coast of Buru, and southward on that of Manipa, for which reason sailing vessels working to the northward are recommended to keep on the Buru side of the channel as much as possible; vessels from the northward in the south-east monsoon should keep towards the west side of Manipa, where they will be less influenced by the northerly current.

Manipa island, about 13 miles E. by N. of Tanjong Pela, is 11 miles long west-north-west and east-south-east, about 6 miles broad at the western part, tapering towards the south-east and 2,426 feet high. It is surrounded by a reef, on which, on the north side of the island, several islets lie. Suangi islet, about one mile from the west extreme of Manipa, is 327 feet high, and is separated from it by a clear and deep channel. View *c*, at page 118. On the south side there is a low wooded islet, Tuban, with a reef off its southern and western sides.

The inhabitants live in seven villages on the south coast, and are engaged in fishing, a little agriculture, and trade in dried fish, poultry, cocoanut oil, sago, and resin. Sago trees abound in the island, and there are numerous wild pigs and deer.

Manipa is under the Residency of Amboina, and belongs to the district of West Ceram. The Government is not represented by an official.

General charts 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

LIGHT (*Lat. 3° 18′ S., Long. 127° 28′ E.*).—A *white group flashing* light, showing *two* short flashes *every ten seconds,* is shown at an elevation of 308 feet above high water from a white framework tower, 69 feet high, situated on the north-east summit of Suangi islet; it is visible 24 miles in clear weather. For arc of visibility, *see* Light list.

Anchorage may be had westward of the islet Tuban, in front of Kelang village (where there are the ruins of an old fort), in a depth of 14 fathoms, sand, with the mosque bearing N. 9° E., and south extreme of Tuban S. 58° E.

To reach this anchorage from the eastward, pass at least 2 miles southward of Tuban island, and do not haul northward until the mosque bears eastward of North; the mosque must not be allowed to come westward of North when approaching the anchorage, in order to avoid the banks west of Tuban, on which there are depths of 4 and 5 fathoms and perhaps less.

The channel inside Tuban is spacious enough for large vessels, and affords a well-sheltered anchorage; it cannot be used without local knowledge.

Plan of Lakania road on 3440.

Lakania road.—Anchorage, exposed to the north-westward, may be obtained in Lakania road on the north-west coast. Shoal water and reefs extend about one cable from the shore in the southern part and 2½ cables in the eastern part of the road; outside the reefs the depths are from 5 to 24 fathoms, hard bottom.

Chart 942a Eastern archipelago, eastern portion.

Kelang island, east-north-east of Manipa, is 10 miles long east and west, 7 miles wide, and 2,771 feet high. It is surrounded by a reef which extends 8 cables from the western side. View *d,* at page 118.

The island is thinly inhabited, and is resorted to by people from the neighbouring islands for fishing. A village is situated on the coast about one mile south-eastward of the western point. There are numerous deer and wild pigs on the island.

Kelang strait, between Manipa and Kelang, is 3 miles wide at the narrowest part, and quite safe; it is sometimes used instead of the wider strait of Manipa, but the tides in it are very strong, causing heavy ripplings.

Babi island, eastward of the north point of Kelang, is small and high; the passage between it and Kelang is only fit for small vessels, and the passage on the other side between it and Ceram is only half a cable wide and but 3½ fathoms deep; this passage is used by small coasters, but should not be used by other vessels except in case of necessity.

Boano island (*Lat. 3° 0′ S., Long. 127° 54′ E.*), 8 miles north-east of Kelang, is 12 miles long north-east and south-west, high and rugged to the westward, but low to the eastward. The highest point, a small cone on the south-east side of a mountain ridge, is 1,969 feet high; the north-eastern part of the island is about 200 feet high. The shore reef on the south side is narrow, but extends off a considerable distance on the north-west and north sides, which should not be approached nearer than 2 miles.

There are heavy tide-rips about 10 miles westward of the north-west point of Boano. Broken water and tide-rips extend for a considerable distance off the north-east point of Boano, to which a wide berth should be given.

On the western side of the island is an inlet or lake, the western side of which is connected with the sea by a channel from a half to one cable wide, the sides of which consist of steep hills; off the western entrance to this channel are two islets. There is also a narrow channel connecting the north side of the lake with the sea.

The island contains about 1,300 inhabitants; the only villages, two in number, are on the south-east coast. The island is rocky and infertile, so that the natives have to obtain their means of support from other islands. A branch of industry is the building of praus, at which they are very skilful.

Boano strait, the channel between Boano and Ceram, is 3 or 4 miles wide, but is much contracted at its southern part by small islets and shoals which stretch along the Ceram shore. The strait can be navigated by day; the coast reef from Boano extends out about one cable from its south side, but the east coast should be passed at the distance of a mile.

Charts 942a, b, Eastern archipelago, eastern portion.

CERAM ISLAND has not hitherto been thoroughly explored, for the interior consists, especially in the west, of mountainous country clothed with dense forests and peopled by savages, who are by no means well disposed to Europeans. The island is about 185 miles long, east and west, and 18 to 38 miles wide. A high mountain chain stretches in an east and west direction and reaches its greatest height in the eastern part of the island, but does not run the whole length of the island, as has been stated. The highest peak is said to be about 10,000 feet. Various summits have the appearance of extinct craters. In many places the mountain chain extends to the coast, but in others gives place gradually to low land. The flat stretches of coast are covered with extensive forests of sago and cajaput, the former of which provide for the necessities of the inhabitants, not only of Ceram, but also of the neighbouring islands. The mountains are thickly wooded, and furnish excellent timber.

The western end of Ceram, the peninsula Huamual or Little Ceram, is connected with the main island by a low narrow isthmus. The two bays, Elpaputi on the south and Seleman on the north coast, divide the island into two parts named West Ceram and East or Middle Ceram.

The numerous rivers run generally north and south, and are for the most part unnavigable, and often quite dry in the dry season. The principal are the Ruata, which discharges near Makariki village (*Lat. 3° 15′ S., Long. 129° 0′ E.*), on the east side of Elpaputi bay; the Bobot, southward of Atiahu, east side of Tuluti bay; and the Sapulama on the east side of Seleman bay. Roads are wanting in the whole island, communication between the coast and the interior being carried on by means of footpaths, and between the coast villages always by sea.

The island is subject to the Resident of Amboina, and forms an administrative district under an Assistant Resident at Piru. This district is divided into the sub-districts West Ceram, Wahai, Amahai, Waru, and Ceram Laut and Goram. West Ceram is the western part of the island, and includes Manipa and the islands eastward of it; Wahai is the northern and Amahai the southern part of Middle Ceram; Waru is the eastern part and Ceram Laut and Goram include the off-lying islands. The three first sub-districts are under Civil administrators; Waru and the islands Ceram Laut and Goram are under Posthouders.

The inhabitants are Alfurs, but on the coast mixed with Javanese, Makassarese, and Malays. Their number is about 63,487.

The coast population consists for a great part of Christians and Mohammedans. The Alfur Christians are chiefly found in West Ceram and Wahai, and differ little in manners and customs from their heathen fellow-countrymen.

The Alfurs are divided into two tribes under the names of Patasiwa and Patalima; the first inhabit the west, and the last the east part of the island. The Patasiwa are wild and fierce-tempered; they are well-built, and of a fairly tall stature, while those in the middle of the island are smaller, averaging nearly 5 feet.

The principal products of Ceram are sago, timber, nutmegs, dammar, and other forest produce. Industry is on a low scale, and trade is carried on mostly by barter by foreigners with native vessels.

Winds and Weather.—On the north coast of Ceram during the south-east monsoon, the weather is fine with regular land and sea breezes; the north-west monsoon is the wet and squally season, though it brings fine weather at Amboina, and all along the south coast.

The south-east monsoon brings rain on the south coast and dry weather on the north coast. A small part of the south coast, however, has a climate similar to that of the north coast, viz., the peninsula of Huamual and that part of Piru bay westward of Kaibobo village. The separation is very sharp. Rice planting, which is done in the rainy season, takes place at Kaibobo and to the westward in December and January, just as on the north coast, while at Hatusua, a few miles south-eastward of Kaibobo it takes place in June and July. This is caused by the high land of Amboina intercepting the vapour brought by the south-east monsoon.

The climate of Ceram is much cooler than that of Java and Sumatra. The atmosphere is regularly cooled by a fresh sea breeze, which blows all day, and is succeeded at night by a cool land wind from the high mountains.

Chart 942a, Eastern archipelago, eastern portion.

WEST COAST OF CERAM.—From Tanjong Tananurong (*Lat. 2° 51′ S., Long. 128° 9′ E.*) the coast trends south-westward for about 14 miles to Kottania village, forming several bays, and is fronted in places by islets and reefs. Kawa village, about 4½ miles south-westward of Tanjong Tananurong, lies in a bay open to westerly winds; off the north point of the bay reefs extend some distance north-westward, on which is Siri islet. There is anchorage in the bay in 25 fathoms, and the 5-fathoms line is three-quarters of a cable from the shore. The bight in which Kottania village is situated is very shoal, and vessels bound to that place anchor in a bay northward of it, eastward of Marsego island. Between these two bays, reefs and islets extend westward some distance. Communication between Boano island and Piru bay is carried on by means of a footpath from Kottania. Along this part of the coast the hills come close to the sea except at Kottania, where the land is swampy and covered with mangroves. The north-west coast of Ceram forms the eastern and southern sides of Boano strait.

Ceram island terminates to the westward in a peninsula, the north side of which trends westward 16 miles from Kottania to Tanjong Haja, whence the west coast trends southward 26 miles to Tanjong Sial, the south extreme. The peninsula is joined to the main island at Kottania by a low, narrow isthums, and is hilly with an unbroken ridge 1,673 feet in maximum height, extending from the isthmus to Tanjong Sial. The northern side has several islets and reefs off it; Babi island lies off Tanjong Haja, *see* page 121; the western side is steep-to,

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

and the hills come close down to the coast. Kambelau village, about half-way between Tanjongs Haja and Sial, is the only village on this part of the coast. Batu Lobang is a rocky point, 50 feet high, in the form of steps. Tanjong Sial is a sharp point, about 70 feet high, with a few rocks off it. On the eastern side of the peninsula is Piru bay.

Plan of Gunong Sudi anchorage on 911.

Gunong Sudi anchorage, south of a group of islets about 6 miles eastward of Tanjong Haja, lying on a large reef which extends nearly 3 miles northward, and more than half-way across to Boana island, has a depth of 22 fathoms at 7 cables from the shore; and 19 fathoms at the distance of 2 cables. From the anchorage in 22 fathoms the west end of Pulo Latunjani bears North and the south point of Nusa Nitu island E. by N. There is a watering place at the foot of Gunong Sudi.

Chart 942a, Eastern archipelago, eastern portion.

NORTH COAST of CERAM.—From Tanjong Tananurong, the north-west point of Ceram, the coast trends east, and is safe and steep-to for 47 miles, to where the chart shows a reef 2½ miles off the coast, on which the least depth is one fathom; it then turns about E.N.E. for 10 miles to a low point, Paa.

Tuju islands (*Lat. 2° 45′ S., Long. 128° 59′ E.*), are a group of six or seven low, wooded islands, surrounded by shoals which extend to a distance of 8 miles north-westward from Tanjong Paa. Nusa Maina is the outermost of these islands, and should be given a berth of 2 miles, as reefs project some distance from it; the channel between the Tuju islands and Ceram is narrow, encumbered by reefs, and not recommended.

Westward of the southernmost islands of the group are two reefs said to dry partly at low water, and farther south-westward and near the Ceram shore is a reef with 1½ fathoms on it.

Seleman bay.—Immediately to the east of Tanjong Paa is a deep bay, named Seleman from a village at the head of it. The bay is about 15 miles wide at the entrance between Paa and Pamalu points, and is readily recognised by the Tuju islands. On the south side are two inner bays forming the harbours of Sawai and Besi. At the head of the bay the mountains approach the sea, and near the coast is Mount Seleman, 2,658 feet high. Close to Seleman village is a pyramid-shaped hill, 984 feet high; on the east and west sides of the bay are low hills. Tjampadak island on the west side and the other islands at the head of the bay are low. Westward of a line from Seleman village to Tjampadak island are numerous reefs, with very little water

General charts 2759a, 1263.

Charts 942a, b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

on them, and which dry towards the shore. The beach at Seleman village is sandy.

Anchorage.—There is anchorage near the village of Paoni, more than one mile southward of Tanjong Paa. The shore reef extends one cable off, and outside are three detached reefs, with a depth of 14 fathoms between the northern and the centre reef and 19 fathoms between the centre and the southern reef. Northward of the village are three small rivers, two of which are blocked with sand, the northernmost is navigable by boats for some distance. There is also said to be an anchorage off Seleman village.

Plan of Sawai harbour on 930.

Sawai harbour (*Lat. 3° 0′ S., Long. 129° 10′ E.*), in the south-east part of Seleman bay, is an inlet 1¾ miles long, and three-quarters of a mile wide, narrowing towards the head, with a depth of from 15 to 40 fathoms, muddy bottom, affording good anchorage in the south-east monsoon. The north-east side is formed by a hilly tongue of land projecting north-westward; the west side is formed by a spur from the high mountain range, which ends at the western entrance point in perpendicular rocks. On entering the bay a vessel should steer south for Mount Seleman, passing west of Kalapa and Attui islands standing on a reef which extends northward and westward from them to the distance of nearly a mile; and when clear of the reef she should haul eastward into the harbour.

Sawai village stands on a very narrow beach on the south side of the harbour; the houses stand partly in the water on piles. Good drinking water can be had from a small river just eastward of the village.

The plan of Sawai harbour must be used with great caution. It is advisable to send for a pilot here to the Rajah of Seleman.

Besi harbour, eastward of Sawai harbour, is about three-quarters of a mile wide at the entrance, and extends southward over a mile, with depths of from 10 to 23 fathoms. In front of it lie the low islands Kasuari and Pombo, besides a large reef. At the head of the bay on the east side is Besi village. A good landmark is a conical hill, named Panoping, on the east side of the bay.

There is anchorage in about 13 fathoms off Besi village.

To enter, the channel eastward of Pombo is to be preferred; there is also a channel westward of Kasuari, but it is very narrow between the reefs on either side. It is necessary to keep on the eastern side of the bay when entering, as a reef extends half-way across the entrance from the west point.

General charts 942a, b, 2759a, 1263.

Plan of Wahai bay and Hatiling bay on 930. Var. 2° 40′ E.

Wahai and Hatiling bays lie about 25 miles eastward of Tanjong Paa, and directly westward of Tanjong Sekola, the northern extreme of Ceram. The coast as seen from the offing is nearly straight; it is therefore necessary when making for either of these bays to keep within 3 or 4 miles of the shore in order that the houses may be seen. The land in this neighbourhood appears to be more cleared than elsewhere.

Wahai (*Lat. 2° 48′ S., Long. 129° 28′ E.*), the western of the two bays, is a small inlet between reefs which extend 4 cables from the shore west of the bay, and for a cable further from the shore to the eastward; on the latter reef there are sandbanks which partly dry. The inlet is about 1½ cables in width at the entrance, and the depths decrease gradually from the entrance to 7 fathoms at the head, where it is about one cable wide.

Beacons.—Two iron screw pile beacons, with white balls, mark the western side of the channel into Wahai bay, situated respectively 2¼ cables N. 26° W. and 5¼ cables N. 24° W. from the flagstaff at Wahai.

On the eastern side there are three similar beacons with black truncated cones, situated respectively 5¾ cables N. 8° W., 2¾ cables N. 4° W., and 2¼ cables N. 8° E. from the flagstaff.

A patch of 1¾ fathoms, steep-to, lies 82 yards S. 43° W. from the outer black beacon.

Wahai village, with 2,850 inhabitants in 1905, is the head-quarters of the district of that name; it lies on a flat, behind which the ground rises to a ridge 197 feet high, stretching eastward to the river flowing into Hatiling bay. Immediately west of Wahai, at the foot of the ridge, are the villages of Hatuwe and Hatiling. Eastward of Wahai, the small river of that name discharges into the bay; on the right bank is a hillock 50 feet high, forming the eastern point of the bay.

At Wahai is a small military post, the commandant of which is the Civil administrator of the district.

A wooden fort stands on the beach, and a mole extends out over the fringe reef into a depth of 3 fathoms.

The anchorage is in 7 fathoms, half a cable from the end of the mole.

Directions.—From the westward Wahai bay is easily recognised by the fort and Tanjong Sekola, the east point of Hatiling bay. It is less readily recognised from the northward or eastward; in clear weather the low Tanjong Sekola may be made out at 10 miles distance, as an island against the ridge of Wahai, which shows up well against the background of mountains. In the middle of this ridge is a lower part, where Wahai lies. Some light green patches on the hills eastward of Wahai form a good mark; similar patches are nowhere to be found on these heights. From the east, the hilly land of Wahai is the first high land in the immediate neighbourhood of the coast.

As previously mentioned, beacons mark the reefs on each side of the inlet. Sailing vessels can only enter with a leading wind; and in the north-west monsoon must either tow or warp out, as they are liable to encounter a swell outside and a set to the eastward before gathering way. The space is very limited, and a vessel should either moor to the pier or make fast by the stern.

Steam vessels let go the starboard anchor westward of the pierhead, steam round the anchor, and run a hawser out from the stern, and moor with the port side to the pier, so as to be in a position to steam out.

Large vessels must anchor outside the outer beacons.

Rainfall.—At Wahai bay the average annual rainfall amounts to about 86 inches. The three wettest months are January, February, and March, most rain falling in February. The six months from June to November inclusive are comparatively dry, the least rain falling in August. *See* page 324.

Communication.—The vessels of the Royal Netherlands Steam Packet Company call at Wahai once a month, alternately on the outward and return voyages to and from West New Guinea.

Water.—Very good drinking water is to be had from a well at about 160 yards from the pier.

Tides.—It is high water, full and change, at 6h.; springs rise 3½ feet. Three reports state that there is one tide in the 24 hours, but the ranges differ, varying from between 3 and 4 feet to 8 feet.

Hatiling bay (*Lat. 2° 48′ S., Long. 129° 29′ E.*), one mile east of Wahai, is included between the eastern reef of that bay and the reef that borders Tanjong Sekola to one-third of a mile out and nearly dries. The entrance, which is rather less than 3 cables wide, is 4 cables west of Tanjong Sekola, and has a depth of 31 fathoms in the middle. The bay penetrates 1¼ miles S. by E. ½ E. from the entrance to the head, where there is a village, the depth of water gradually diminishing to the southward. A small shoal, covered by 3 feet water, with 7 fathoms close to, lies in the middle of the bay east of Tanjong Aentopra, the western point of the bay, and N. 30° W. of New Hatiling village.

The anchorage is 2½ cables N.N.W. of the village, in a depth of from 12 to 14 fathoms, mud; the southern end of the bay is very shallow, and dries over a good breadth, making landing troublesome.

Plan of Wahai bay and Hatiling bay on 930. Var. 2° 40′ E.

The bay must be approached and navigated by the discoloration of the water on the reefs.

Chart 942b, Eastern archipelago, eastern portion.

Coast.—From Tanjong Sekola the coast trends eastward for 54 miles to Tanjong Lama, and then south-eastward for 14 miles to Tanjong Timor, the north-eastern extreme of Ceram; it is low, and fringed by a narrow reef throughout a great part of the distance. Anchorage may be had in Kobi bay, 23 miles eastward of Tanjong Sekola; and as the coast is clean, it can be everywhere approached by the lead, and good anchorage found with off-shore winds.

Leuwarden rocks, lying east-north-eastward from Tanjong Lama, and 3 miles from the shore, form a reef, 1½ miles in extent, and very dangerous; it is surrounded by a rocky ledge that dries in places, and on which are some rocks always above water. There is deep water near the bank, and the channel between it and the mainland is considered to be safe, but there is no anchorage except close under the coast here.

Plan of Ingelas bay on 930.

Ingelas bay, about 8 miles south-eastward of Tanjong Lama, affords very good anchorage in 7 fathoms, sand and mud, about 3 cables N.E. ½ E. from the village of Ingelas, on the south-western shore of the bay. Vessels are sheltered here from winds between north and south-east, through west and south.

Plan of Bula bay on 911.

Bula bay (*Lat. 3° 7′ S., Long. 130° 31′ E.*), about 12 miles south-eastward of Tanjong Lama, affords anchorage off the village of Bula in a depth of 11 fathoms, with the flagstaff bearing S. 11° W., distant 6 cables, and a conspicuous tree near the beach N. 65° W.; small vessels can anchor a little further in. The landing place is near the flagstaff on a sandy beach which dries out to the distance of about 2½ cables; high water is the best time for landing. There are breakers in the bay sometimes during the south-east monsoon.

At a short distance inland, petroleum springs have been discovered; this part of Ceram is therefore likely to become of considerable importance.

Chart 942b, Eastern archipelago, eastern portion.

Waru bay.—From Tanjong Timor the coast trends south for 18 miles, and then turns east for 12 miles, forming the great bay of Waru, with the town of the same name at the head of it. There is a pier at the town with a house at its outer end.

Anchorage, safe in both monsoons, can be had off the town in a depth of 12 fathoms, mud; the depths decrease gradually to the 5-fathoms line, and at 2½ miles from the town the depth is 29 fathoms.

General charts 942b, 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

There is also anchorage off Kilbawar, a village 7 miles to the northward, in 4 fathoms, mud; this village may be known by the cocoanut trees near it, there being no others visible.

The coast between Kilbawar and Waru is bordered by a reef, about 8 cables wide, as is also the coast from Waru to the eastward. The sandy beach in front of the town dries out to the distance of nearly a cable; the pier is then dry. Waru is the head-quarters of a Posthouder.

Directions.—Steer for the anchorage off Waru with the pier, flagstaff, or the prison with tiled roof bearing South; and anchor with the east point of the roadstead in line with the furthest eastern land bearing N. 82° E. When approaching from the East, run through the passage south of Parang until the north-west point of that island bears N. 49° E., when steer S. 49° W., with that bearing on astern, until the pier or one of the other marks mentioned bears South, when steer for the above position.

Parang island, nearly 5 miles northward of the east point of Waru bay, is about 3 miles long north-west and south-east, 408 feet high, and level; it can be seen at a distance of 20 miles. It is surrounded by a reef which extends 2 miles to the northward, and also a considerable distance north-westward and eastward, and should be given a wide berth.

EAST COAST.—Tanjong Tioli, the eastern point of Waru bay, is low, as is also Tanjong Ilor, about 3 miles south-south-eastward of it. The Maswan river flows into the sea between these points, forming a delta. There is anchorage off the river, with the eastern point of Parang island bearing N. 21° W. and Kilbadir hill S. 69° W. From this anchorage the Urlin rocks, southward of Tanjong Ilor, bore S. 10° W.

Akat island, about 4 miles southward of Tanjong Ilor, is about 110 feet high, and is connected with the shore by a reef. To reach Gah village on the shore to the westward it is necessary to pass northward of the island. Off Gah there is anchorage in from 4 to 6 fathoms.

Tanjong Hu (*Lat. 3° 36′ S., Long. 130° 52′ E.*), the eastern extremity of Ceram, lies 4 miles southward of Akat island, and about 3 miles farther southward is the village of Kian Darat, off which there is anchorage in 14 fathoms, mud, with the point of land to the northward bearing N.E. and the mosque N. 69° W. Near this village is the small islet of Bazaket.

The coast then trends southward for about 12 miles to the south-east point of Ceram.

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Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

Landmarks.—The following mountains and hills in the eastern part of Ceram are remarkable, and, being shown on the chart, may be used for bearings.

Tatirin, near Tanjong Lama, stands apart from the mountain chain, and is therefore a good mark until hidden behind Tanjong Timor.

Kilbadir hill, 984 feet high, is westward of Tanjong Ilor, and south-eastward of Waru; when bearing W.S.W. it has the shape of a monk's hood; its north side is steep, with some bare white patches.

Mount Selangor, 2,540 feet high, is an isolated mountain, which from the east has the shape of a cheese cover, and from the south-east has a round top with a knob on each side; it stands near the coast midway between Tanjong Hu and the south-east point of Ceram. View *b*, at page 136.

Buru (Suru) and Teri are two mountains of a range, situated near the south-east point of Ceram; Buru, 2,461 feet high, is steep on the east and sloping on the west side; Teri, 2,589 feet high, is the westernmost of the range, and when seen from the south, ends in a point. View *a*, at page 136.

Madurang island, 11 miles east-south-eastward of Tanjong Hu, is about 3 cables long east and west, narrow, and surrounded by a steep-to reef that projects one mile on the east side. At a short distance from the reef there is no bottom to be obtained. On the east side of the reef is a cove through which boats can reach the shore, but as a great part of the reef dries at low water landing is difficult on account of the sharp rocks. The highest part of the island is on the north-west side, where it rises to 88 feet. There is no drinking water on the island, which has some trees on it. A recent report places the island about 2 miles east-north-east of its charted position.

Chart 942a, Eastern archipelago, eastern portion.

The SOUTH COAST of CERAM is high and steep-to, with no known dangers off it except those near Tanjong Hoya and those off the south-east point. It is indented by three great bays, but these only afford anchorage very close to the shore. In each monsoon a counter current will generally be found close to the coast, which can be utilised by vessels working against the monsoon.

Piru bay (*Lat. 3° 15′ S., Long. 128° 5′ E.*), the westernmost on the south side of Ceram, is a wide bay, bounded on the west by the peninsula which terminates in Tanjong Sial, and fronted on the south by the island of Amboina. The western side of the bay is fringed by a narrow steep-to reef. On this side are the villages of Luhu and Loki. Luhu is a dirty Mohammedan village. Loki is thriving and Christian, and lies in the middle of a flat covered with sago trees; it has a conspicuous white church on the beach. At the head of the bay

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is Piru village, the head-quarters of the Assistant Resident of the Ceram division and of the Civil administrator of West Ceram; there is a military post here. On the east side of the bay opposite the north end of Babi island is Kaibobo village, and farther south-eastward are the villages of Kamal, Waisamu, Hatusua, and Kairatu. Hatusua is now deserted. The shore of Ceram eastward of Babi island is bordered by a reef which extends some distance off, as charted, and the remainder of the east side is fringed by a narrow reef.

Islets and dangers.—The islets Kasa and Babi, lying towards the head of the bay, are nearly connected by reefs, leaving a narrow channel, with $3\frac{3}{4}$ fathoms least water between Babi and the coast of Ceram. Kasa is low, sandy, and wooded; Babi is hilly, and about 200 feet high. There is no anchorage off Kasa island; on the north side of the reef a brisk current runs now and then.

Reefs which dry, and are marked by fishing stakes, lie N. 41° W. from the western extreme of Babi island at the distance of $2\frac{4}{10}$ miles and $3\frac{7}{10}$ miles respectively. There are several reefs at the head of the bay near the shore.

Anchorages.—On the west side of Piru bay there is good anchorage for small vessels off Luhu village in 15 fathoms, with Luhu mosque bearing N. 16° W., and the stone wall of a conspicuous old fort N. 77° W.; northward of the anchorage the ground is foul, and in the bight of Luhu are coral reefs, which partly dry. Luhu mosque has a square roof; that of Ila to the westward has a conical roof.

Off Loki village (*Lat. 3° 15′ S., Long. 128° 3′ E.*) there is good anchorage in an inlet in the coast reef. In the centre of the inlet is a small reef with a depth of one fathom on it, which is marked by a beacon and is not indicated by discoloured water; the shore reef, however, is generally clearly seen. The south-east extreme of the reef on the north side of the inlet is marked by a beacon. Vessels should anchor eastward of the one-fathom shoal and near the southerly reef where the bottom is of sand and slopes regularly.

The anchorage off Ketabang village, 2 miles southward of Loki, is not recommended, the reef being very steep-to.

Northward of Loki there is good anchorage in 30 fathoms, with the south side of Babi island bearing N. 63° E., and the east side of the peninsula S. 3° W. A remarkable tree, northward of Loki, bearing W. by S., leads to the anchorage.

Another good anchorage is found more to the north in front of Tanah Gojang village, in 25 fathoms, with the south side of Babi island bearing East and the east side of the peninsula S. 5° W. The houses of the village bearing West lead to the anchorage.

There is also anchorage in 20 fathoms, about 3 miles northward of

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Loki, in front of Noordkane village. The bottom is everywhere stony, and there is little current.

Piru roadstead, at the northern end of the bay, has two reefs in it; on the shore reef on the eastern side are two beacons. Vessels pass westward of these beacons, and anchor with the boat pier bearing N.E. and the two beacons in line about South. This anchorage is only suitable for small vessels; larger vessels must anchor southward of the southern beacon in about 15 fathoms. Good marks for Piru are, the boat shed, situated under a light green hill, and to the right of it an old church, a large building with white walls.

Plan of Kaibobo road on 911.

There is anchorage in Kaibobo road (*Lat. 3° 13′ S., Long. 128° 11′ E*), off the northern end of Babi island in from 16 to 20 fathoms of water.

Chart 942a, Eastern archipelago, eastern portion.

Farther south-eastward there is anchorage off the villages of Kamal and Waisamu. Waisamu is difficult to make out; the village lies just south of a small river, and is only recognised by an open booth and some low huts. To reach the anchorage, steer N.E. with the village well on the port bow, and when close to the shore a solitary tree will be seen on the beach; southward of this tree is a small bay in which there is anchorage in 18 fathoms.

There is also anchorage off the deserted village of Hatusua, where the shore reef is half a cable wide, in about 20 fathoms.

Off Kairatu village there is anchorage in 20 fathoms, sand, with the village bearing N. 65° E. and the point southward of Hatusua N. 19° W. Northward of the village of Kairatu is a wooded point, from which a reef extends south-south-east; it bears N.E. from the above anchorage.

Coast.—The part of Ceram that separates Piru bay from Elpaputi bay is mountainous, rising to a height of about 4,920 feet. The mountains come close down to the shore, with a sandy flat everywhere between them and the sea. At 2 miles westward of Tanjong Latu the mountains give place to low hills, which descend regularly to the point. Along this part of the coast are several villages, off most of which there is anchorage.

Anchorages.—Eastward of Kamarian village, in a bight of the coast reef, there is anchorage in from 11 to 14 fathoms at one cable from the land; as the bottom slopes steeply, a hawser to the shore is advisable.

Off Tihulale village there is anchorage in 19 fathoms at one cable from the shore, with the middle of the village about N.N.E. and the east point of Haruku island in line with Melano island S. 33° E.

Off Rumakia village, at one cable from the shore, there is anchorage

General charts 942a, 2759a, 1263.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 40′ E.

in 20 fathoms, sand, with the flagstaff bearing N. 21° E., and the north-west point of Saparua island S. 7° W. Here the bottom is again steep, and a hawser should be taken to the shore. Near and to the eastward of Rumakia several dangers lie near the shore.

All these anchorages are unsafe during the south-east monsoon.

Vessels proceeding from Piru bay to Elpaputi bay should keep in mid-channel between Ceram and the off-lying islands, in order to avoid the reefs off the coast near Rumakia village and a reef lying half a mile northward of Haruku island.

Elpaputi bay (*Lat. 3° 15′ S., Long. 128° 53′ E.*), 18 miles east of Piru bay, is about 16 miles wide between the entrance points, and penetrates 16 miles to the north-east; the whole shore of the bay is steep-to. A reef extends 2¾ cables from Tanjong Latu, the western entrance point.

Tafelberg, a remarkable mountain, distinguished by white patches caused by landslips, lies about 9 miles N. 20° W. from Mani village. The high land on the west side of the bay comes down to the coast only in one place, just southward of Paulohi village, where a wooded chalk cliff named Pohon Batu rises steeply from the sea to a height of 100 feet, and is very conspicuous. Everywhere else along the coast there is low flat, especially northward of Pohon Batu, where the mountain chain is some distance back from the coast, and at the head and east side of the bay there is a broad, wooded, alluvial plain, where many villages are situated.

Tanjong Kuaku, at the eastern entrance of the bay, is low, and difficult to distinguish against the high land behind it; on the inner side of the point is a remarkable tree.

Most of the villages in the bay are Christian, but the inhabitants are so in name only, for in their manner of living they are entirely Alfur. The principal villages are Mani on the west side and Makariki on the east side of the bay; Awahia, on the north side of the bay, is a European coffee and cacao establishment.

During the south-east monsoon there are heavy breakers along the north-west shore of the bay, making landing very difficult, and there are frequently breakers during the north-west monsoon.

Anchorages.—Eastward of Tola river, on the west side of the bay, there is anchorage in from 20 to 30 fathoms with Tanjong Latu bearing S. 3° W. and the point at the river entrance S. 46° W. Immediately behind the coast is a large lagoon.

Off Mani village there is anchorage in 10 fathoms, sand, at half a cable from the shore, with Tanjong Kuaku bearing S. 55° E. The coast is clean, and the beach rises steeply. These anchorages are unsafe in the south-east monsoon, and landing on this coast is then impossible.

General charts 2759a, 1263.

Charts 942a, b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

There is anchorage in front of Makariki village, situated about 8 miles north-eastward of Tanjong Kuaku, in 26 fathoms, sand; the shore reef here is only 55 yards wide, and at high water a boat can enter the river there. Except in Amahai bay, there is no other anchorage.

Plan of Amahai bay on 930.

Amahai bay (*Lat. 3° 22′ S., Long. 128° 54′ E.*), situated just within Tanjong Kuaku, at the eastern side of the entrance to Elpaputi bay, is a small bay affording safe anchorage at all seasons in irregular depths of from 6 to 22 fathoms.

The bay is 7 cables wide at the entrance between Kuaku and Mapui points, about 5 cables wide at the head, and extends southward about 7 cables. The eastern side is low, marshy, covered with mangroves, and bordered by a reef, partly dry at low water, which fills up nearly half the bay. The northern part of the reef extends westward about half a mile, and is marked on its western edge by a black beacon.

The channel between this reef and the western point of the bay is about a quarter of a mile wide, with deep water. At the head of the bay, off the village at about 175 yards from the shore, is a shoal with 4½ feet over it, marked by a black beacon, and about one cable westward of it the plan shows a patch of 3½ fathoms least water. The beacons mentioned above are not official.

The anchorage is about 3½ cables north-westward of the village at the head of the bay, and one cable or more from the western shore, in the depths mentioned.

Amahai village lies at the head of the bay, and is the principal place of the district of the same name, and the head-quarters of a Civil administrator. There is a pier here, and near the Government house is a flagstaff.

Communication.—The vessels of the Royal Netherlands Steam Packet Company call at Amahai once every four weeks on the outward voyage from Amboina to West New Guinea, and on every alternate return voyage at intervals of about eight weeks. *See* page 17.

Rainfall.—The average annual rainfall at Amahai is 110 inches. May, June, July, and August are the wettest months, most rain falling in July; November, December, January, and February are the driest months, least rain falling in February. *See* page 324.

Chart 942b, Eastern archipelago, eastern portion.

Coast.—From Tanjong Kuaku the coast trends eastward for about 40 miles to Tanjong Hoya, the western entrance point of Tuluti bay. A short distance eastward of Tanjong Kuaku is Ruta village, named Pelapo on the chart, of which almost nothing is to be seen: the only landmark is a large cleared piece of ground, which is visible a good distance. A vessel can anchor here in 44 fathoms, close to the shore; also off Sepa village, in 45 fathoms, swinging close to a reef eastward of the village. When steaming along the coast between the above villages, at the distance of one mile from the shore, no dangers were seen.

A large reef is reported by the pilots to lie off Tamilau village, situated about 17 miles westward of Tanjong Hoya (*Lat. 3° 26′ S., Long. 129° 34′ E.*).

Hoya or Tuluti bay is about 28 miles wide and 8 miles deep to the northward, and is open to winds between south-east and south-west. The shore is difficult to approach in the south-east monsoon on account of the heavy breakers on the beach, and only affords good anchorage during the north-west monsoon. The bay is recognised by the high mountain chain close to the coast in the western part of the bay; a flat strip of coast of some extent lies along the eastern side. North of the western part of the bay, at about 11 miles from the coast, is the highest mountain chain in Ceram. A number of small rivers flow into the bay, of which the Bobot, on the eastern side, is the principal; it forms a delta at its mouth, and is of little importance, as even small praus can only ascend it a short distance. The delta is covered with grass; everywhere else is dense forest, varied here and there, near the villages, by cocoanut trees.

Along the shore are several small Mohammedan villages, the inhabitants of which are engaged in trade, fishing, and a little agriculture. The Alfurs of the interior are more even-tempered than those near Elpaputi bay.

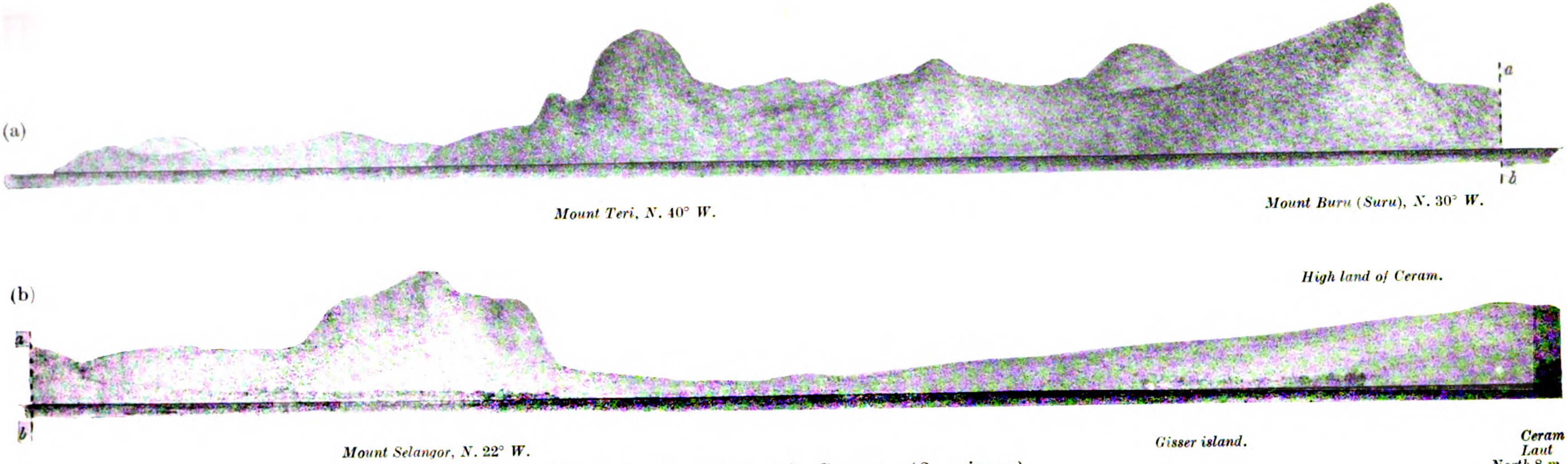
The chart shows two banks in the north-west part of the bay, near the shore. The western point of the bay, Tanjong Hoya, is low and shelving, with a reef extending from it one mile south-eastward, which has a low wooded islet named Pekelo on it; this reef runs 7 miles along the shore to the westward of the point.

Anchorages.—In a small bight northward of Haja village, near the west point of Hoya bay, there is anchorage in 33 fathoms. Reefs extend from the north and south points of the bight, and a small stream flows into it.

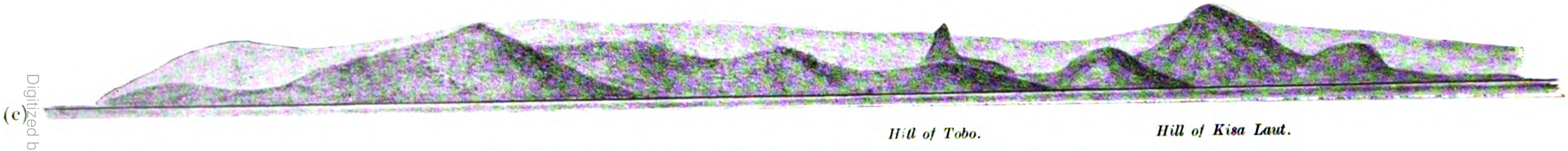
Plan of Tehoru anchorage on 911.

Tehoru village, about 2½ miles north-west of Tanjong Hoya, lies in a small bay which affords excellent anchorage during the north-west monsoon and at the change of the monsoons. During the south-east monsoon, however, it is not so good, as it is exposed to easterly winds. There is anchorage in 16 fathoms, sand, about 1¾ cables from the western shore, with the flagstaff bearing S. 33° E. and a black stone on

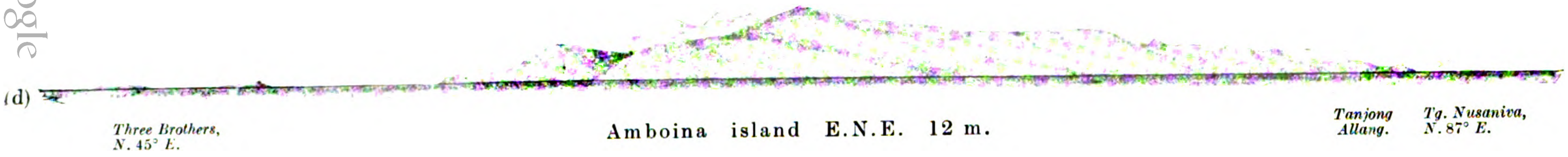
To face page 136.]



South-east point of Ceram (2 views).


(c)
Hill of Tobo.
Hill of Kisa Laut.

South coast of Ceram. Tobo and Kisa Laut.



Amboina island E.N.E. 12 m.

Plan of Tehoru anchorage on 911. Var. 2° 40′ E.

the beach S. 51° W.; also at about one cable from the land at the south-eastern end of the bay, with a sternfast to the shore, the mosque bearing about S. 35° E. Good drinking water can be procured from a small river in the north-western part of the bay.

Plan of Awa anchorage on 911.

Off Awa village (*Lat. 3° 19′ S., Long. 129° 30′ E.*), in the north-west corner of Hoya bay, there is anchorage in 18 fathoms, sand, at about three-quarters of a cable from the shore. The water shoals quickly north-eastward of the anchorage. Awa creek, north-eastward of the village, is obstructed by sandbanks and shoal water, which extend nearly 1½ cables outside the entrance.

Chart 942b, Eastern archipelago, eastern portion.

There is anchorage off Wolu village, on the north shore of the bay, about 7½ miles eastward of Awa. The depths decrease regularly from 17 to 5 and 2½ fathoms. Good drinking water can be obtained here from a small river, which is navigable by boats.

Off Tehua village, also on the north shore about 6 miles east of Wolu, there is anchorage in 12 fathoms, sand, with the mosque bearing N. by W. At 1¼ cables nearer the shore the depth was 9 fathoms.

On the east side of the bay there is anchorage off Ableta at one cable from the shore; off Atiahu, in 24 fathoms, at 4 cables from the shore, with the mosque bearing East; and off Bemu, in 7 fathoms, north-west of the village, at one cable from the shore; from 8 fathoms the depths decrease slowly to the shore, but outside that depth the bottom is steep.

Communication.—Vessels of the Royal Netherlands Steam Packet Company call at Tehoru once in eight weeks on every alternate voyage from Amboina to West New Guinea, and also on every alternate return voyage, the interval between the visits of the outward and return vessels being about five weeks, and another three weeks elapsing before the next outward vessel calls. *See* page 17.

Coast.—From Hoya bay the coast trends east-south-eastward for about 30 miles to Tanjong Kelibon, and is clean, except in some places, as far as Messing village.

Off Werinama village, close eastward of Hoya bay, there is anchorage with the mosque bearing N. 41° E. Reefs extend off-shore both eastward and westward of the village.

Off Batu Asa village, 10 miles eastward, there is anchorage in 20 fathoms, mud, with the flagstaff bearing N. 13° W. and Tanjong Kisi S. 74° E. The chart shows reefs near the shore at about 3 miles westward of Batu Asa, and also between that place and Tanjong Kisi.

Tobo village, 5 miles eastward of Batu Asa, has a conspicuous pointed hill near it; a reef lies westward of the village. View *c*, at page 136.

General charts 942b, 2759a, 1263.

Plan of Kisa Laut bay on 911. Var. 2° 50′ E.

Kisa Laut bay affords very good anchorage in the south-east monsoon, the bottom sloping gradually from 20 to 5 fathoms. From an anchorage in 10 fathoms at about 3 cables from the shore, Mount Oson, 3,248 feet high, bears N. 15° W. Drinking water is difficult to obtain here. View *c*, at page 136.

Chart 942b, Eastern archipelago, eastern portion.

Coast.—Southward of Messing village, and 1½ miles from the shore is a reef with 4 fathoms on it; from this reef the extreme of the land of Ceram bears S. 61° E.

From Tanjong Kelibon (*Lat. 3° 42′ S., Long. 130° 28′ E.*) the coast trends south-eastward for about 21 miles to the south-eastern extreme of Ceram, and is foul. From Tanjong Kelibon eastward the width of the shore reef increases, and beyond Gosai islet detached dangers lie outside the reef; the western of these lies southward of the islet, and has 4½ fathoms on it; on other coral shoals about here the depth is 1½ fathoms. Farther south-eastward, Gofa islet is separated from the shore reef by a narrow passage in which the depths are from 5 to 10 fathoms. A conspicuous landmark about here is Teri mountain, 2,589 feet high, which has the form of a sugar loaf.

The south-east point of Ceram makes as an island, and is surrounded by a reef which extends nearly 4 miles south-eastward. Near the eastern edge of the reef lies the inhabited island of Keffing. On the reef southward of the point are two small islets.

Plan of Keffing strait on 3440.

Keffing strait, between Keffing island and Ceram Laut, is divided into two channels by the reef on which Gisser island stands. The western channel, with depths of 13 to 14 fathoms in the fairway, is 6 cables wide between the reefs which extend half a mile off Keffing and Gisser islands. The western channel is marked by stakes surmounted by crosses on the western reef and balls on the eastern reef. In the western channel there is sometimes a nasty sea caused by tide rips.

The eastern channel, with depths of from 6 to 12 fathoms, is barely 2 cables wide between the Gisser island and Ceram Laut reefs. It is said to be marked by stake beacons surmounted by balls on the western reef and triangles on the eastern reef. The beacons are not to be relied on.

Shoal.—A shoal, with a depth of 2 fathoms, lies in the southern approach to the western channel of Keffing strait, the northern extreme of which lies 2½ miles S. 45° W. from the north-western point of Kiliwaru island, in line with the south-eastern extremity of Gisser island.

General charts 942b, 2759a, 1263.

Plan of Keffing strait on 3440. Var. 2° 50′ E.

The shoal extends about 5 cables in a south-westerly direction from the above position.

Gisser (*Lat. 3° 52′ S., Long. 130° 53′ E.*), with a population of about 300, is a low, sandy, atoll-formed island, surrounded by a reef which extends 4 cables to the north and 11 cables towards the south, and marked by beacons. There are two villages on the east side. Over the entrance of the lagoon, which is on the east side, there is a bridge with an opening for the native craft to pass through at high water. Boats can lie at the pierhead northward of the lagoon during the lowest tides. The Posthouder of the Ceram Laut and Goram subdivision is stationed at Gisser.

Anchorage.—The anchorage is about a cable east of the pier of Gisser, in 10 or 12 fathoms; vessels should moor. With southerly winds the ebb, which sets to the southward, causes a heavy sea. The limits of the road are a line drawn N. 30° E. from the north-west point of Gisser and a line drawn N. 50° W. from the north-east point of Kiliwaru.

Supplies.—Fish can be obtained in abundance; other provisions and water are scarce; the latter is obtained from Ceram Laut in the dry season.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, on the West New Guinea route, call at Gisser once a month, alternately on the outward and return voyages. The vessels on the Dobo and Merauke route call once a month on the return voyage from those places.

Tides and tidal streams.—During October and November it is high water, full and change, at Gisser, at 2h.; rise of tide, 4½ feet. The flood tide sets to the north at the rate of from 2½ to 3 knots at springs. Southward of the reef of Gisser the first of the flood has a westerly direction. The ebb stream sets to the south. The change of streams from north to south-going occurs at 2 hours after high water at springs and one hour after high water at neaps.

Tidal signals.—The direction of the tidal stream is indicated by flags hoisted at the pier.

A red flag indicates a north-going stream; a white flag indicates slack water, and a blue flag a south-going stream.

Kiliwaru is a small sandy islet only a few feet above the level of the sea; there are two villages, the houses being built on piles, but it has, nevertheless, a large Bugi and Ceram population, numbering about 600, and is largely resorted to by traders from New Guinea, the Aru, Ké, and other islands, as well as by those from Celébes. The Ceram Laut reef extends 2 miles out on the north-west side of Kili-

Plan of Keffing strait on 3440. Var. 2° 50′ E.

waru, which islet can be approached by boats on this side through a channel across the reef, leading to a cove on the north side of the islet, where is the best landing.

Directions.—When approaching the anchorage off Gisser island from the southward, steer N.E. ½ E. for the remarkable tree on Ceram Laut, which will then be in line with a beacon standing on the shore reef, and continue that course for the beacon after the tree has disappeared behind the high land of the island, until the west extreme of Gisser is in line with the south-easternmost ball-beacon on the reef bordering that island. Thence keep midway between the above ball-beacons on the Gisser reef, and the beacons on the reef extending westward from Ceram Laut, up to the anchorage. As before mentioned no reliance can be placed on the beacons being in position.

From the north, steer towards Keffing strait until the north-east point of Gisser is in line with the south-west extreme of Ceram Laut, when alter course in that direction, and keep between the beacons marking either side of the channel. From the northward, Keffing island appears equally high over its whole length; the west point of Gisser is higher than the east point.

When the tide is very strong it is advisable for steam vessels with a fair tide to pass through the strait and re-enter it with the stream ahead, to avoid risk to cables in anchoring.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 40′ E.

The AMBOINA ISLANDS consist of Amboina (*Lat. 3°41′S., Long. 128° 11′ E.*), Haruku, Saparua, Melano, and Nusa Laut. They are all high, and when seen from the southward appear as part of Ceram. The passage between these islands and Ceram is safe, but in working through it a wide berth should be given to the north coasts of Saparua and Haruku on account of the reefs that project from them. The coast of Ceram is said to be clean, except off and eastward of Rumakia.

AMBOINA ISLAND (or Ambon) is the most important of the spice islands, and the town of Amboina is the seat of the Government of the Moluccas. The island consists practically of two islands of unequal size lying parallel to each other, their greater lengths being in an east-north-east and west-south-west direction, united at one point by a low sandy isthmus less than a mile in width. The northern, and larger, peninsula, called Hitu, has a length of about 30 miles with a maximum width of 10 miles; it is very mountainous, some of the peaks rising to between 2,500 and 3,500 feet, in the eastern and western parts of the island, the highest being in the eastern part, with a height of 3,366 feet, and the second highest in the western part, with a height of 2,894 feet; the centre of the island is lower,

General charts 942b, 2759a, 1263.

being nowhere more than 1,673 feet high. Nearly the whole of Hitu is covered with forest, which has been cleared in a few places for gardens. The villages are all on the coast, and the interior is uninhabited. The principal village is Hila on the north coast. A number of small rivers flow into the sea, but are of no use to navigation; they discharge enormous quantities of water in the rainy season, May-August. Almost all the rivers in Amboina are bridged.

The southern peninsula is triangular in shape and about half the size of Hitu, and the highest mountain rises to 1,831 feet.

Numerous shocks of earthquake are experienced; in 1898 a great part of the chief town was destroyed. A great part of the southern peninsula is covered with forest, especially the eastern and middle parts; some has been cleared for cultivation. There is deep water everywhere around Amboina island. View *d*, at page 136.

The inhabitants are partly Christian and partly Mohammedan, and live in separate villages; in each important Christian village there is a church and school. Cultivation, fishing, and retail trade are the principal occupations of the natives; they make good soldiers, and have little taste for seafaring, but frequently cross to the neighbouring islands, chiefly to Ceram for sago, which is the principal food of the people. The principal products of cultivation are cloves, nutmegs, coffee, and cacao; cocoanut trees are also cultivated. The sago grown on the island is insufficient for the requirements.

The Three Brothers are three islets lying off the north-west coast of Amboina; the northernmost of the three is 379 feet high. There is a passage between the southern islet and the coast, but the tidal streams between are exceedingly strong. A reef lies between the two northern islets.

Plan 2611, Amboina bay.

Amboina bay (*Lat. 3° 41′ S., Long. 128° 11′ E.*).—This deep inlet penetrates into the island some 14 miles from the south-western end in a N.E. direction, its entrance points being Tanjong Allang on the west and Tanjong Nusaniva on the east. These points are both steep-to and bear East and West from each other, about 5¾ miles apart; view *a*, at page 148. About 3 cables length south-south-east of the latter point there is a small detached bank of soundings of from 15 to 20 fathoms, on which a vessel might anchor during a calm. The bay continues wide until about 10 miles from the entrance, when it contracts and forms a narrow passage leading to the part named the Inner harbour; *see* page 144.

General charts 942a, 2759a, 1263.

Plan 2611, Amboina bay. Var. 2° 40′ E.

In the outer bay the depths are very great, and it is only possible to anchor in a few places close to the shore. One of these anchorages, on the east side, inside Tanjong Nusaniva, is a small indentation called Portuguese bay (Labuan Raja).

The depths appear to be less on the western side than on the eastern. The western side of the bay is thickly wooded; on the east side part is covered with reeds, and there are also bare flats. The coast rises steeply in many places, and elsewhere there is generally a very narrow flat between the hills and the bay.

LIGHT (*Lat. 3° 47′ S., Long. 128° 6′ E.*).—A *white flashing* light, showing a short flash *every five seconds*, is shown, at an elevation of 453 feet above high water, from a white iron framework tower, 69 feet high, about 1.600 yards within Tanjong Nusaniva; it is visible 25 miles in clear weather. For arc of visibility, *see* Light list.

Plan of Amboina road on 2611.

Fort Victoria, facing the sea, has only a part of the walls remaining: the site is occupied by an encampment of wooden buildings: in front of it is the ordinary landing place, and the main road to the town passes through it, there being only a pathway outside the glacis to the town. The jetty in front of the fort is about 80 yards long, of rough stone except at the outer end, which is of screw piles: the depth of water at the steps at the outer end is about 10 feet at low water. A few yards northward of the jetty are some old piles, the heads of which only show at low water; boats must therefore be careful when going alongside.

Plan 2611, Amboina bay.

At half a mile south-westward of the landing jetty there is the iron pier of the Royal Netherlands Steam Packet Company, at which large ships can lie for loading and unloading. There are piles north-east and south-west of the pier for convenience in mooring alongside. Vessels drop an anchor and stern warp off the pier in 25 fathoms, and haul alongside with hawsers. The length of the landing stage at the pierhead is 56 feet.

Position.—The flagstaff of Fort Victoria is in lat. 3° 41′ 10″ S., long. 128° 10′ 44″ E.

Harbour lights.—From a mast at the end of the pier fronting Fort Victoria, at the height of 25 feet above high water, two *fixed* lights are shown vertically, *red* above and *white* below; these lights are not to be depended on, and are difficult to distinguish from the other local lights.

A *green* lantern light is shown at night on the north-east end of the Royal Netherlands Steam Packet Company's pierhead, and a *red* lantern light on the south-west end.

General charts 2611, 942a, 2759a, 1263.

Plan of Amboina road on 2611. Var. 2° 40′ E.

Anchorage.—The best anchorage is about 1¼ cables westward of the Fort jetty, in 25 fathoms, with the jetty head bearing from East to E. by S. Outside this position the water is inconveniently deep for anchoring. The old practice of securing a hawser to anchors on the bank to prevent drifting off into deep water is recommended for vessels making a comparatively long stay.

Plan 2611, Amboina bay.

Vessels arriving at night, and intending to go alongside the iron pier in the morning, anchor south-west of that pier. They veer down the anchor with 35 fathoms of cable, and steam as slowly as possible straight for the shore, keeping the lead going, until the anchor holds. The same procedure is recommended when anchoring off Fort Victoria, using from 25 to 30 fathoms of chain.

The collector of export duties and excise acts as harbour-master.

Buoys.—The two red buoys to the north-westward of the landing jetty mark the ends of mooring chains laid from the shore, and are intended only for the small Government steamer and the warship stationed at the port; they are not mooring buoys.

Directions.—Amboina bay is easy of access. Sailing vessels approaching from the westward in the south-east monsoon should work up until Tanjong Nusaniva bears N.N.E., and then stand into the bay, keeping on the eastern side, as there they are less under the influence of the tidal stream. Only in fine weather should much sail be carried, especially in the north-west monsoon, as sudden squalls are frequent; these squalls also occur in the south-east monsoon, but not with the same strength, as the land on the east side of the bay is lower than that on the west side.

Plan of Amboina coaling wharf on 2611.

Coal wharf (*Lat. 3° 42′ S., Long. 128° 10′ E.*).—The coaling wharf is at Tanjong Mungayen, about three-quarters of a mile south-westward of the town. The pier is 32 yards long, with a T head 17 yards long, and there is a depth of 4½ fathoms at its outer end, off which two mooring buoys are established.

Vessels intending to coal at the wharf should steer in with their heads to the south-eastward, keeping about half a cable outside the extremity of the wharf, and run out bow and stern hawsers to the two mooring buoys, and haul in by means of the wooden piles placed at convenient distances along the shore.

Coal.—From 3,000 to 4,000 tons of Government coal is stored here, principally Welsh and Australian, the price being from £3. 10s. to £2 per ton. Labour can be had at the rate of a Dutch rupee of 1s. 8d. a day; 125 tons is the quantity put on board in an ordinary

General charts 2611, 942a, 2759a, 1263.

day's work. About 3,000 tons of coal are imported annually. The Royal Netherlands Steam Packet Company usually have about 1,000 tons in stock.

Inner harbour.—The entrance to the inner harbour commences at 1¼ miles above the town; it is 1½ cables wide between the sandy flat on the south shore and the steeper north shore, and 5 to 10 fathoms deep; it then widens out into a large basin, 3 miles long by 1¼ miles broad, with tolerably even depths over it, varying from 12 to 18 fathoms. It is well sheltered from all winds, but is considered unhealthy, and is not used by ships. The head of the harbour is separated from Baguala bay, on the eastern side of the island, only by the narrow sandy isthmus that connects the two peninsulas into which Amboina is divided.

The isthmus is two-thirds of a mile across; a canal was cut through it, but has become blocked at the eastern end. Praus can pass through it at high water from Amboina bay to Paso, at the eastern end, but for the last 50 yards are placed on rollers and hauled overland at high water to Baguala bay.

The town of Amboina (*Lat. 3° 41′ S., Long. 128° 11′ E.*) is situated about 8 miles from the mouth on the east side of the bay, which is bordered here for 1½ miles by a steep bank about a cable wide; the edge of this shoal is generally marked by fishing stakes, which may also be seen in many parts of the bay; the water deepens rapidly from the bank, and a depth of 40 to 50 fathoms will be found at a distance of 3 cables from the shore.

The town is clean, neat, and regularly built, with straight and wide streets intersected by numerous streams, and bordered by a profusion of flowering shrubs. Behind the town the land rises rapidly to a height of more than 250 feet; it then rises slowly in long flat ridges or terraces to the foot of the mountain chain. It contains two churches, a fine hospital, a town hall, and other buildings. The mercantile part of the town is in a long street facing the sea, with another behind it. As in other Dutch towns in the east, there is a distinct Chinese and Arab quarter, and most of the retail trade is in the hands of Chinese. In 1905 there were 8,328 inhabitants, 879 of whom were Europeans.

Amboina is the head-quarters of the Resident, the Controleur of the Ambon division, and the military commandant of the Moluccas.

The climate of Amboina is considered to be healthy.

Supplies.—Good artesian well water is led in pipes down to the end of Fort Victoria jetty; vessels can use their own boats. Water of good quality (though not equal to the above) can also be obtained when alongside the iron pier, through a hose, from a well near the inner end of the pier.

Provisions are plentiful and moderate in price.

Game, fish, poultry, and every variety of fruit are abundant.

Trade.—The principal imports are rice, provisions, flour, cotton goods, haberdashery, petroleum, tobacco, &c., of a total value, in 1909, of £111,094.

The exports are cloves, mace, nutmegs, copra, dammar, birds' skins, mother-of-pearl shell, &c., of a total value, in 1909, of £292,224.

Communication.—Vessels of the Royal Netherlands Steam Packet Company arrive at Amboina from Singapore, Batavia, Makassar, and other ports every four weeks, and leave for those ports every four weeks.

There is a service every four weeks to Laiwui, Bachian, Ternate, Galela, Tobelo, Ake Selana, Buli, Patani, Weda, Sorong, Dorei, and some other places as far as Humboldt bay, and back to Amboina, calling at the same places. On every alternate voyage Kayeli, Sannana, Kau, and Saonek are also visited.

Also from Amboina every four weeks to Banda Neira, Tual, Dobbo, Liling Luan, Adaut, Tepa, Wulur, Dobo, Merauke, Dobo, Bandan Ellat, Tual, Gisser, Banda Neira, and Saparua.

Also every four weeks from Amboina to West New Guinea, calling at Saparua, Amahai, Piru, Kayeli, Wahai, Kokas, Fak Fak, Gisser, Banda Neira, Tuluti bay, Amahai, Saparua, to Amboina. The alternate voyage is from Amboina to Saparua, Amahai, and then the other places in reverse order.

Tides (*Lat. 3° 41′ S., Long. 128° 11′ E.*).—It is high water, full and change, in Amboina bay, at 0h. 30m.; springs rise 8½ feet, neaps 6 feet. The tides are very irregular, being governed chiefly by the winds. The tidal streams in the bay are weak, especially in the middle of the bay, and are also greatly influenced by the wind.

The following remarks on the tides are taken from the Dutch Sailing Directions:—

The tidal movement is mixed, the double-daily character predominating, and is purely double-daily when, in the second half of March and September, 0° moon's declination falls two days after full and change.

The double-daily tide has springs about 2½ days after full and change, with high water at 3h. and an average range of 4 feet; neaps at the same interval after the quarters, with high water at 9h. and a range of 2 feet.

The single-daily tide has high water on January 1st at fully 8h. p.m.; April 1st at 2h. p.m.; July 1st at 8h. a.m.; and October 1st

Plan 2611, Amboina bay. Var. 2° 40' E.

at 2h. a.m.; springs at half a day after the moon's half-monthly greatest declination, with a range of 3½ feet, and neaps at the same interval after the moon's declination is 0°, with a range of over 6 inches. About the second half of June and December these ranges increase to 4 feet and one foot respectively; about the second half of March and September the range at springs is not 3 feet, and that at neaps is imperceptible.

The high or low waters of the two spring tides cannot fall together.

Tidal signals.—The direction of the tidal streams is signalled from the iron pier of the Royal Netherlands Steam Packet Company.

A red flag at the south-west end of the pierhead indicates a stream setting north-east; a white flag at the north-east end of the pierhead, a stream setting south-west.

At night these flags are represented by a *white* light hoisted above the *red* light on the pier for the north-eastern stream, and above the *green* light for the south-western stream.

At slack water the signal is shown for the direction whence the stream is expected.

The direction in which the vessels at anchor are swung is not always an indication of set of the tide at the pierhead.

Winds and weather.—*See* Meteorological table, page 323.

Chart 942a, Eastern archipelago, eastern portion.

South and east coasts of Amboina.—From Tanjong Nusaniva (*Lat. 3° 47' S., Long. 128° 6' E.*) the coast runs east-north-east 15 miles, and then turns into Baguala bay. There are several bays, about which little is known, and villages; abreast one of the latter, Lea hari, at flood tide, trees are seen standing 3 cables out in the sea. The village is not visible, but Tanjong Riki near it is remarkable from its overhanging cliffs.

Baguala bay, about which little is known, is 4 miles wide at the entrance between Tanjongs Hutumuri and Tial, and runs in about 5 miles north-westward; it has many large shoals and reefs in it, with deep water close to them; the depth of water is from 4 to 5 fathoms at the head of the bay, whence it increases gradually outward, there being 18 fathoms in the middle of the bay off Suli village, 8 fathoms on the north side, and 17 fathoms on the south side. Vessels should pass well outside the entrance of the bay.

To the north of Baguala bay the coast forms a bight, in which there is anchorage in from 19 to 21 fathoms. Wai village, in this bight, is difficult to recognise; one sees two dark green points—the village lies a little westward of the western of these. A boat shed is the only landmark, and there a Netherlands flag is generally hoisted on the arrival

General charts 942a, 2759a, 1263.

of a vessel. The anchorage is with the boat shed bearing S. 80° W. and Pombo island N. 55° E.

Northward of the southern point of the bight, and 3 cables from the shore, are some rocks always above water, and northward of the bight the coast reef is about 1½ cables wide.

North coast of Amboina.—This is very steep-to, with depths of 20 to 30 fathoms close to the shore reef, which is nowhere more than a cable in width, except at the eastern point of the bay in which Liang village is situated, where the reef extends off 3 cables. There is a small settlement at Hila, but no secure anchorage for vessels of any size on account of the great depth of water. The largest river in Hitu discharges here; it is half a cable wide at the entrance at high water, and in mid-stream the difference in depth in the wet and dry seasons is 17 feet. Hitu village is partly Christian, and has a church. On the beach is an old fort.

Anchorages.—Eastward of the Three Brothers islands, and near the west point of Hitu, there is anchorage in 30 fathoms, sand, close to the shore, with the north point of the northern island bearing N. 36° W. and the west point of Hitu S. 19° W.

Good anchorage may be had off Sait village in a depth of 14 to 17 fathoms, sand, with the mosque bearing S. 43° W., and Sait point about West.

The outer edge of the road is very steep, the ground rising from deep water suddenly to 18 fathoms; then follows a sufficient anchorage space up to the depth of 12 fathoms, beyond which the bottom is steep to the shore. Eastward of the anchorage the reef projects somewhat.

Hitulama (*Lat. 3° 34′ S., Long. 128° 10′ E.*) has anchorage off it in 30 fathoms. To reach it, steer S. 24° E. for the mosque, and anchor when the above depth is obtained, with the point of land to the eastward bearing N. 19° E. North-east from Hitulama is another village, the mosque of which is very like that of Hitulama, but has a white-topped roof.

Haruku island is roughly triangular with the apex to the east, about 9 miles long, and 1,200 feet high in the centre. On the south coast, between Aburu and Wasu, are two remarkable conical hills, the northern and higher of which has an elevation of 500 feet. The south-western end of Haruku is a plateau 300 feet in height, ending in Tanjong Lama. Off the point is a high round rock, covered with vegetation. The villages are all situated on the coast; the most important is Oma, near Tanjong Lama. A road leads from Oma along the west and north coasts. Near Oma village are two hot springs, one not far inland and the other on the beach eastward of the village, where it is overflowed at high water. The island is surrounded by a reef, which on the north-west side extends a considerable distance, with a bank above water on it. The population numbers about 9,000. There are no Europeans. The Mohammedan population live in four villages on the north-western part of the island, and the Christians in the other villages. The island is under the government of the Controleur at Saparua. View *b*, at page 148.

Anchorages.—Aburu bay, on the south coast of Haruku, is a round, deep bay enclosed by high land. On the eastern side the hills rise steeply from the sea, with some rocks at the foot. At the head of the bay, and on the west side, is a narrow sandy flat, on which Aburu village is built; here the water is shoal near the shore, but farther out large vessels can anchor.

There is no anchorage off Oma, the water being too deep. In the south-east monsoon the south coast of Haruku should not be approached, on account of the heavy breakers on the rocky coast; traffic between the villages of Aburu, Wasu, and Oma is then interrupted, there being no road between those places.

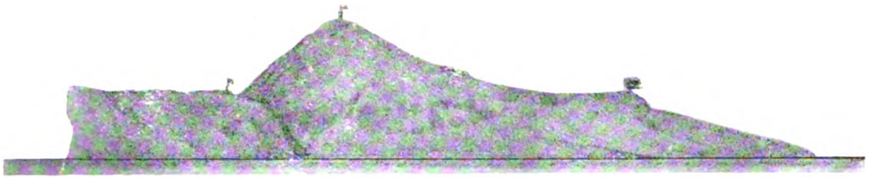
Haruku, formerly the principal village on the island, lies on the west coast, on the right bank of a river. In front of this village there is anchorage in about 20 fathoms, with the flagstaff bearing S. 62° E. It is not advisable to go closer in, as the bank is very steep inside 17 fathoms. About a cable southward of the flagstaff, on the beach of a small promontory, stand the ruins of a fort; just north of the fort is the best landing place for boats, which can pass between the rocks on the shore reef here; at high water they can pass over the reef.

Vessels can anchor off Pilau village, on the north coast, in 27 fathoms, sand, with Tanjong Papela, the north extreme of the island, bearing N. 84° W., and the Regent's house S. 33° W. Tanjong Papela (*Lat. 3° 31′ S., Long. 128° 26′ E.*) is low and covered with bakau trees.

The channel between Haruku island and Amboina is 3 miles wide at the southern end, but is reduced to a width of 1¼ miles at the northern end by Pombo islet and a reef eastward of it. Pombo islet is low, flat, and sandy, with cocoanut trees on it, and surrounded by reef to the distance of 1½ cables.

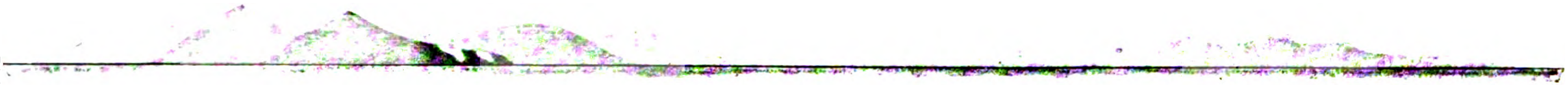
The detached reef in the fairway between Haruku and Pombo lies with the north point of the islet bearing W. by S. ½ S., is 2¾ cables in diameter, and dries; the reef is steep-to, and between it and Haruku there is a depth of 70 fathoms.

Saparua island is divided into two peninsulas by the deep bays of Tuhaha on the north and Saparua on the south side of the island, the isthmus between being about an hour's walk across. The island is

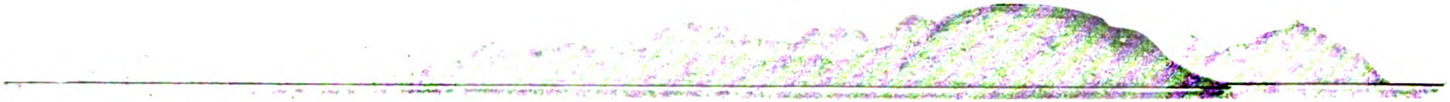

(a)
Tanjong Allang.
Tanjong Nusaniva.

Amboina bay, entrance points, from the westward.

Haruku island from the south.



Saparua island and bay from the south.


(d)
Mountains of Ceram.
N.N.E. ¾ E.
N.E. by E. ¾ E.

Nusa Laut.

hilly, the highest summit, situated near the western entrance point of Saparua bay, having an elevation of 1,000 feet or less, with a dome-shaped top. The north-west part of the island is about 300 feet high, becoming low on the coast. Along the west coast is a low flat, covered with cocoanut trees. A ridge of hills about 700 feet high extends along the north coast, except in the north-east part along Tuhaha bay, where it is low; along the east coast the hills are from 300 to 500 feet high. Some insignificant streams flow into the sea. On the island are 19 villages, all on the coast. Three of these are inhabited by Mohammedans, the remainder exclusively by Christians. The population in 1902 amounted to 19,000. View *c*, at page 148.

The channel between Saparua and Haruku is from one to 2 miles wide; in the narrowest part, near the north-east extreme of Haruku, the shore reef of that island extends to the distance of 3 cables, and from the north-west point of Saparua for about half a cable; great care is necessary at this part, but the reefs are discernible at low water. A vessel using it should keep on the Haruku side, as the reefs on the Saparua side extend to one mile from the shore. The tidal streams in this channel are very strong, and there is no anchorage.

Plan of Saparua bay on 911.

Saparua bay (*Lat. 3° 35′ S., Long. 128° 39′ E.*) is on the south side of the island; the inner part, or road, lying between Tanjong Paperu and Tanjong Torana opposite, affords good anchorage in the north-west monsoon. It is open to the south-east monsoon, which sends in some swell, but never so much as to interrupt communication with the shore. In the outer part of the bay the depths are great; the shore is fringed by a narrow reef, steep-to, a great part of which dries. Off the western entrance point of the outer bay is a wooded islet, 30 feet high, connected with the shore by a reef. The inner bay is fringed by reef, which extends 2 cables out on the south side, and 3½ cables in one place on the north side. Two villages lie on the west side, and three on the east side of the bay. A reef with 1¼ fathoms on it, and marked by a buoy (not official), is stated to lie with Fort Duurstede bearing N. 2° W., distant about 4 cables, and Tanjong Paperu S. 47° E.

There is anchorage anywhere in the bay; the best anchorage is in a depth of 10 or 12 fathoms, sand and mud, 2 to 3 cables S.E. by S. of Fort Duurstede; care must be taken not to approach nearer to this fort, as there are patches of 2 to 3 fathoms at the distance of 1½ cables from it. Small craft can anchor close to the shore off Saparua town, which is situated on the north side near the head of the bay.

Fort Duurstede (built of stone) stands on a projecting rock on the beach near the town. Near the fort, on the west side, is a stone pier, which at low water is difficult of approach by boats; westward of

Plan of Saparua bay on 911. Var. 2° 40′ E.

Saparua is another pier. There is a health officer. In 1905 there were 2,354 inhabitants, of whom 229 were Europeans.

The Controleur of the Saparua division resides here.

Saparua bay is not open to general commerce.

Rainfall.—The average annual rainfall at Saparua is about 137 inches. May, June, July, and August are the wettest months, most rain falling in June; November, December, January, February, and March are the driest months, least rain falling in November. *See* page 324.

Communication.—Vessels of the Royal Netherlands Steam Packet Company employed on the West New Guinea route call at Saparua once every four weeks on the outward voyage, and on every alternate return voyage. The vessels on the Aru islands and Merauke route call every four weeks on the return voyage to Amboina.

Tides.—It is high water, full and change, at Saparua island, at 1h. 0m.; springs rise 6 feet.

Directions.—When entering Saparua bay pass about 1½ cables eastward of Tanjong Paperu, and steer N. 47° W. for the pier westward of the town; this will lead northward of the shoal of 1¼ fathoms already mentioned, when anchorage may be taken up as requisite.

Chart 942a, Eastern archipelago, eastern portion.

Tuhaha bay, on the north side of the island, is little known, and should not be entered beyond the line joining the two points, as several dangers lie in the entrance. Five villages lie along the east side of the bay. Off the north-eastern point of the bay there is anchorage, sheltered from southerly winds, in about 16 fathoms of water, N.W. by W. from the Regent's house in the village there. It is advisable to have a hawser to the shore, on account of the steep bottom and the strong stream.

Melano islet (*Lat. 3° 38′ S., Long. 127° 36′ E.*), south-west of Saparua, is about 700 feet high, as charted, but said to be over 300 feet, sloping to the north-west, and thickly wooded.

Nusa Laut, the easternmost island of the Amboina group, is about 3 miles long, north-east and south-west, 1,176 feet high, and bordered by a reef that partly dries and which, at the north-east point of the island, extends to a quarter of a mile from the shore. The hills rise steeply from the sea nearly everywhere, beaches being found here and there between the projecting points. Only southward of the north-west point the hills stand back from the coast, with a plain between them and the sea. There are hot springs on the island, two of which are near Nalahia bay and one near the north-west point. There are seven villages, and the population of about 4,000 is wholly Christian. View *d*, at page 148.

General charts 942a, b, 2759a, 1263.

Plan of Nalahia bay on 911. Var. 2° 40′ E.

Nalahia bay, on the north coast, affords anchorage sheltered in both monsoons, in a depth of 25 fathoms, mud and sand, one cable eastward of a scarped point named Namula, on the west side, with that point bearing N. 70° W. and Tanjong Wachukeke N. 55° E. The latter point is covered with low trees, and Tanjong Tola, about 8½ cables westward, has a clump of slender trees on it, higher than those in the neighbourhood. From these points reefs extend about 1½ cables, and the same distance northward of Tanjong Namula. The village is 140 feet above the sea, in the south-west angle of the bay, and is reached by a very steep road.

It is stated that while the plan is sufficiently accurate, the configuration of the coastline is not in agreement with the actual contour. Good water can be obtained close to the landing place. Near the south shore of the bay there is a hot spring with a temperature of 151° Fah., and another lies close westward of Tanjong Tola, at the foot of the hill forming the point; at high tide this spring is under water.

Chart 942b, Eastern archipelago, eastern portion.

The channel between Saparua and Nusa Laut islands is about 2 miles wide, but vessels should not approach Saparua within 3 cables, nor Nusa Laut within 5 cables. By keeping in mid-channel, the passage can be used at night.

The BANDA ISLANDS (*Lat. 4° 32′ S., Long. 129° 53′ E.*) consist of ten islands, six of which lie close together, and between them form the harbour of Banda. These last are Gunong Api, Neira, Lontar or Great Banda, Kraka, Pisang, and Kapal. The others are detached, and lie within a radius of 17 miles of Gunong Api.

The soil of the islands is extremely suitable for nutmeg cultivation: the trees are grown principally on Neira, Lontar, and Aij, which are divided into plantations for that purpose, but some are also grown on Run and Rozengain islands. On the last-named island are numerous cocoanut trees. Gunong Api does not produce nutmegs, but has cocoanut trees on the coast.

The Banda islands form part of the Banda district of the Amboina residency, and are under the government of a Controleur, who resides at Banda Neira.

The islands of Neira, Lontar, Rozengain, Aij, and Run are inhabited, and the population in 1901 numbered over 9,000, of whom 729 were Europeans. The natives are a mixed race from the various islands in the archipelago. Their principal occupation is working in the plantations.

The natives are averse to regular labour, and are lazy and addicted to drink. Arabs and Chinese are engaged in retail trade. The prosperity of the islands entirely depends on the production of nutmegs and mace, and owing to the continued fall in the price of spices, the purchasing power of the people has much decreased.

Suangi (*Lat. 4° 19′ S., Long. 129° 43′ E.*), the north-western island, 13 miles north-west of Gunong Api, is a large bare rock, about 330 feet in height. View *a*, at page 154.

Run island, about 10 miles W. by S. ½ S. from Gunong Api, is the western of the Banda group; it is 615 feet high, and rises steeply from the sea at the north and south-west points, and in the middle of the south side; elsewhere it slopes gently. It is partly surrounded by a reef, which at the north point dries out some distance and encloses Nailaka islet. Except in the south-west there is a clean white beach, frequented by turtle. There is no drinking water on the island; that from wells is disagreeable; rain water is caught in masonry cisterns, and in long droughts water must be brought from Neira. The population of the island is about 150. View *c*, at page 154.

On the north-east side of the island, vessels can anchor in deep water, from 38 to 40 fathoms, at 2 cables from the shore. Native craft find shelter here near the beach in the west monsoon, October-April.

Aij island, lying 4 miles eastward of Run, is generally flat; on the east side are two hills, the higher of which has an elevation of 448 feet. The island is under nutmeg cultivation. On the south side it is steep, and fronted by a broad reef; on the north side it slopes gently, and there is a narrow white sand-beach. Elsewhere it is cliffy, with rocks in places; the north-east point is high. View *b*, at page 154.

On the north side of the island is Fort Revenge, built in the beginning of the 17th century; near the fort is the village, with about 700 inhabitants in 1906. Just eastward of the fort is a pier.

Plan of Banda harbour on 1460.

Gunong Api is a steep volcanic cone, 2 miles in diameter, and 2,033 feet high. It is clothed with bushes to within 700 feet of the summit, and continually emits smoke and sulphurous steam; the eruptions of this mountain have been frequent and destructive; the last one took place in 1852. *See* view on chart 1460, and view *d*, at page 154.

Lontar, or Great Banda island, is crescent shaped, 7 miles long by one to 1½ miles broad, and is traversed from end to end by a ridge of hills and mountains, the highest summit having an elevation of 1,703 feet. The western half of the northern shore is bordered by a reef which extends 2 to 3 cables out, and considerably narrows Lontar channel, which separates Lontar from Gunong Api; the rest of the island is also fringed by a narrow reef, which, in the bays of the outer

Plan of Banda harbour on 1460. Var. 2° 50′ E.

coast, makes landing from boats difficult. The principal nutmeg plantations are on this island.

There are three villages on the island; Lontar, on the north side, opposite Gunong Api, lies on the slope of an old crater wall, in which 300 steps have been hewn, leading from the landing place to the village and the ruins of an old fort. Celammon (Slamon) lies on the west side of the north point; northward of the village the land rises to a height of about 1,280 feet. Waier village lies on the east coast, in a small bay, where there is an old fort.

Pisang and Kapal islands (*Lat. 4° 28′ S., Long. 129° 55′ E.*) are connected by a reef, and lie north-westward of the north point of Lontar, separated from it by Celamme channel, a deep channel about 5 cables wide and free from danger, but the eddies are strong. Pisang is entirely planted with cocoanut palms; Kapal is only a bare rock.

Neira island, or Banda Neira, on the eastern side of Gunong Api, is about 1½ miles long, north and south, and rises to a height of 787 feet; on the summit there is a flagstaff and signal station. It is the principal island of the group and of the whole Banda division, and is also the seat of government and of the law courts, which are situated in the town of Banda or Neira, situated in the south part of the island. The remainder of the island is taken up by nutmeg plantations. A reef, about 2 cables wide in places, borders the island on its northern, eastern, and southern sides. Fort Nassau stands on the south-west point of the island, and northward of it, on a hill, is Fort Belgica, both dating from the beginning of the 17th century, and now abandoned. The buildings in Fort Nassau are partly used for warehouses. Two piers run out from the western shore, at which vessels of deep draught can secure; the northern one belongs to the Royal Netherlands Steam Packet Company, and rests on screw piles; the other belongs to a private firm, is entirely built of wood, and is about 23 feet shorter than the other. Two small piers project from the south side of the island, the western one near Fort Nassau and the eastern opposite the residency; both these piers are dry at low water, the residency pier earlier than the other. View *d*, at page 154.

The channel between Neira and Gunong Api, named Sun channel, is of irregular breadth and depth, and at the southern end is less than half a cable wide, and only 3 fathoms deep, with three shoals in the centre in a north and south direction from each other, with 5 feet, 1¼ fathoms, and 7 feet over them respectively; tidal streams run through it with great force. Kraka islet lies in the middle of the northern entrance, the passage between it and Gunong Api being better than the passage between Kraka and Neira, which is narrowed by reefs on both sides.

General charts 942b, 2759a, 1263.

Plan of Banda harbour on 1460. Var. 2° 50′ E.

Anchorage.—Steam vessels intending to load or discharge at Banda enter the Sun channel at the northern end, and secure to one of the two piers on the western side of the town, above mentioned.

The roadstead is situated southward of the town, between Neira and Lontar islands, and is approached from the westward by Lontar channel; from the eastward, through Celamme channel; and from the northward, by the Eastern or Neira channel; large vessels cannot enter the roadstead through Sun channel.

Soundings of 25 fathoms commence three-quarters of a mile east of the south point of Neira, and from thence lessen gradually to 5 fathoms at the western part of the roadstead. A good berth is in a depth of 7 or 8 fathoms, sand and coral, with the residency pier bearing North; the chart shows a detached shoal of 3 fathoms about one cable westward of this line and 3 cables from the Neira shore. By keeping the north point of Lontar open of the south-east point of Neira a vessel will keep outside this shoal. A berth in 5 fathoms is with the south-east point of Neira in line with Celamme channel, and the signal station in line with Fort Belgica. The bottom is hard, and it is recommended that vessels should moor to prevent fouling the cables. There is a strong stream in the road, the flood setting eastward; a rate of 3 knots an hour was observed. Greater depth than charted is reported in the roadstead. The postmaster acts as harbour-master.

Directions for Banda harbour.—A steam vessel entering Sun channel (*Lat. 4° 31′ S., Long. 129° 53′ E.*), intending to go alongside one of the piers, head to the north, should keep as close as possible along the Gunong Api shore until nearly abreast the pier, then turn with starboard helm and steer straight for the Banda shore just northward of the pier, going as slowly as possible, with the port anchor and 30 fathoms of chain hanging from the bows. When the anchor holds, the vessel is hauled alongside by hawsers. An off anchor and hawser from the stern is also used. In the north-west monsoon the vessel should be hauled off from the pier before starting; at that season, should the vessel have been moored with her head to the south, getting away from the pier and turning is attended with some difficulty, and even danger. Sailing vessels should not use the Sun channel.

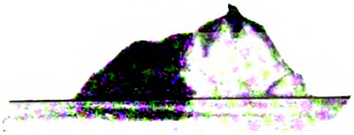
To enter the roadstead.—The western or Lontar channel is reduced to an available width of one cable by the reefs on the south side; the Gunong Api side should therefore be kept close aboard in using the channel.

The Eastern or Neira channel, between Neira and the north point of Lontar, is quite clear. Sailing vessels enter by the eastern channel during the south-east monsoon, and go out by the western; they take the contrary direction during the north-west monsoon.

General charts 942b, 2759a, 1263.

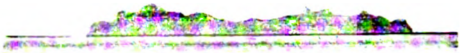
To face page 154.]

(a)



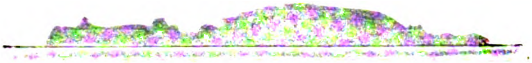
Suangi (Banda islands),
N.E. by E. 6 m.

(b)



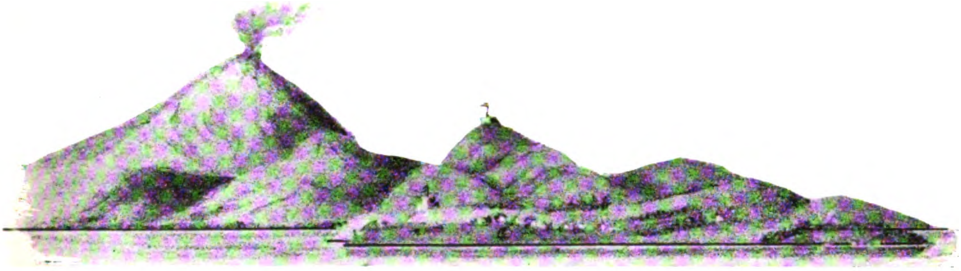
Aij island, S.E.

(c)



Run island, S.S.E.

(d)

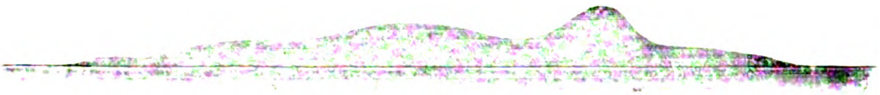


Gunong Api and Neira from roadstead.

(e)

Rozengain island from southward, distant 8 m.

(f)



Goram island, E.N.E.

(g)

Manavoka island, East.

Plan of Banda harbour on 1460. Var. 2° 50′ E.

In the south-east monsoon, sailing vessels are recommended to pass northward of Kapal island instead of using the Celamme channel, where, under the high land, calms, variable winds and sudden squalls are often found; but whichever passage is used, in either monsoon heavy squalls sometimes come off the high land. Vessels should not attempt to pass between Pisang and Kapal islands.

When approaching the roadstead from the north-eastward, the coast of Neira should not be closely approached, and the reef off the south-east point of that island is reported to extend farther off than charted, so it is advisable to keep in mid-channel, and then to steer W.N.W. for the anchorage. To communicate with the town from the road at low water, steamboats should enter the Sun channel.

Banda or **Neira** (*Lat. 4° 32′ S., Long. 129° 53′ E.*), on the southern part of Neira island, is the European settlement and the seat of government and of the law courts. The western part of the town contains the Chinese quarter and warehouses; farther eastward is the European quarter, consisting of three nearly parallel streets, with cross streets between them. The eastern part of the town contains the military encampment, and behind it and the European quarter are the native villages. In 1905, the town had 4,130 inhabitants, 677 of whom were Europeans.

Along the south coast of the island is a fine avenue, where the principal buildings are situated.

Climate and **rainfall.**—The climate is considered healthy, and there are no endemic diseases. The mean temperature at Banda is 82° Fah.; in the month of August it sometimes falls to 68° at night.

The mean annual rainfall at Banda is 111 inches, but the amounts vary considerably in different years. In 1895, a very dry year, the fall was only 62 inches; on the other hand, in 1889, a wet year, it amounted to 168 inches. The three wettest months are April, May, and June, and the four driest are August to November, inclusive. *See* page 324.

The north-west monsoon sets in about the middle of November, and occasionally blows with violence; the south-east monsoon seldom blows so fiercely. Rain falls in both monsoons. *See* page 13.

Trade.—The principal exports are nutmegs, mace, mother-of-pearl shells, and birds' skins. The imports are rice, provisions, tobacco, canvas, soap, and petroleum.

Communication.—Vessels of the Royal Netherlands Steam Packet Company call at Banda Neira frequently. Those on the North New Guinea route from Singapore and Batavia call every four weeks, both going and coming. Those on the West New Guinea route call every other month on the outward voyage, and on the alter-

Plan of Banda harbour on 1460. Var. 2° 50′ E.

nate months on the homeward voyage to Amboina. A vessel also calls from Amboina every eight weeks, returning to that place immediately. Vessels on the Merauke route call every four weeks, both on the outward and return voyages. Every three or four months a German steamer in connection with the North German Lloyd calls at Banda to load for Singapore and Europe. *See* page 17.

Supplies are scarce and dear; water can be obtained by the Lontar shore, at a place E. by S. of the anchorage. Coal is generally to be had, but the supply is always small, and not to be relied on.

Tides.—It is high water, full and change, at 2h. 0m.; rise of tide at springs, about 9½ feet. The Austrian corvette *Saïda* reported, in 1885, that the flood stream runs from Gunong Api towards Pisang island at the rate of 3 knots an hour.

The tide is mixed, with a predominating double-daily character. In the second half of March and September the tide is even purely double-daily. The double-daily tide has springs 2½ days after full and change, with high water at 3h. 30m., and a mean range of over 5 feet; neap tides at the same interval after the quarters, with high water at 9h. 30m., and a range of 2½ feet. In the second half of March and September the range at springs increases to 6½ feet, that at neaps decreases to 2 feet; in the second half of June and December the spring range decreases to 5 feet, and that of neaps increases to nearly 3 feet.

The single-daily tide has high water on January 1st at about 8h. p.m.; April 1st, about 2h. p.m.; July 1st, about 8h. a.m.; and October 1st at about 2h. a.m.; and springs half a day after the half-monthly greatest declination of the moon, with a mean range of 3 feet; neaps at the same interval after the moon's declination is 0°, with a range of less than a foot. In the second half of June and December these ranges increase to 4 feet and more than one foot respectively; in the second half of March and September that at springs decreases to 2½ feet and that at neaps is imperceptible.

The high or low waters of the two spring tides cannot fall together; the highest water levels occur when, in the second half of March and September, the moon's half-monthly greatest declination happens 2 days after full or change; the lowest, when the same happens in the second half of June and December. When 0° moon's declination occurs 2 days after the quarters the movement of the water reaches a minimum, particularly in the second half of March and September.

Chart 942b, Eastern archipelago, eastern portion.

Rozengain island (*Lat. 4° 33′ S., Long. 130° 2′ E.*), or Rozagyn, 5 miles east-south-east of Lontar, is 536 feet high, is surrounded

General charts 942b, 2759a, 1263.

by a reef except on the south side, and has a small islet off its north-east point; it is inhabited, and nutmegs are grown there. There is anchorage on the western side of the island. The channel between Rozengain and Lontar is clear. View *e*, at page 154.

Rozengain reef (*Lat. 4° 38′ S., Long. 130° 6′ E.*), partly above water, lies 6 miles south-east of Rozengain island; the sea breaks heavily over it. The commander of the Netherlands vessel *de Zaan* thought that he saw breakers between the reef and the island, and suspected that the channel was not safe.

General charts 2759a, 1263.

CHAPTER IV.

BANDA SEA; KEI, ARU, SERWATTI, AND TENIMBER ISLANDS.

VARIATION IN 1911, increasing about 1½ minutes annually.

Charts 942a, b. Var. 2° 50′ E.

BANDA SEA.—The space between the south-east portion of the Celebes and the islands lying off it on the one hand, and New Guinea on the other, having Ceram on the north and the chain of islands extending eastward from Timor on the south, has been called the Banda sea.

All the islands in this sea are subject to the Dutch government, who have a Posthouder at the principal places. Steamers of the Royal Netherlands Steam Packet Company visit the islands periodically. *See* page 17.

The Banda islands would be properly included in the description of this sea, but for greater convenience they have been given in the last chapter with the Amboina islands. The Buton islands and the chain of islands from Timor westward are out of the scope of this work. Kissa and the islands from Timor eastwards are included in this chapter.

Soundings and Temperature.—Three deep soundings were taken by the *Challenger* when crossing the Banda sea, the greatest depth attained being 2,800 fathoms (*Lat. 5° 23′ S., Long. 130° 38′ E.*) N.E. of Bird island; several other depths of over 2,000 fathoms are recorded on the chart, the greatest being 4,000 fathoms, at about 40 miles W. by N. from Gunong Api in the Banda islands. In the serial temperatures taken by the *Challenger* the temperature remained the same from 900 fathoms to the bottom, indicating that the depth of water over the ridge separating the basin of the Banda sea from the Pacific and Indian oceans does not exceed that depth.

Tides.—The recorded observations of the times of high water, and of the direction of the tidal streams, are unfortunately too few to afford even a fair estimate of the movements of the tides. The tidal wave enters the Banda sea from the north by the Molucca passages and Pitt channel; and from the south-west by the channels on either side of Timor; but the place of meeting of these waves has not been determined. The only reliable information obtained as yet is as

General charts 2759a, 1263.

follows:—According to the *Molukscke Archipel* the flood stream in the Banda sea sets to the east, and H.M.S. *Flying Fish* observed off the Aru islands that the flood-tide set in a S.E. direction at the rate of 2 knots an hour. The tides are probably largely influenced by diurnal inequality, as sometimes only one tide has been observed in the 24 hours.

Winds, weather, and currents have been described in Chapter I.

Chart 942a, Eastern archipelago, eastern portion.

Lucipara islands, 104 miles S. by W. of the south-west point of Amboina, are a group of four low, wooded islands on a reef occupying a space of 5 miles in length east-south-east and west-north-west, which dries nearly everywhere at low water and is steep-to. The north-western island is the largest and highest of the group, and the tops of the trees reach a height of 108 feet; they cannot be seen more than 12 miles from the deck. The islands are without inhabitants except during the turtling season, and there is no anchorage. There are wells of drinking water on the north-west side of the north-western island. The channel between Lucipara and Turtle islands is reported to be safe.

William reef, about 3 miles in extent, lies with its nearest part about 3½ miles south-westward of the Lucipara islands; it dries at low water, has two sandbanks on it which never cover, and is steep-to. The reef is stated to be 6 miles distant from the Lucipara group, and the channel between is deep and clear.

Turtle (Schildpad) islands (*Lat. 5° 21′ S., Long. 127° 45′ E.*) are three small wooded islands, low, and surrounded to a distance of 2 or 3 miles by coral reefs, which dry at low water and are so steep-to that no anchorage is obtainable, and are therefore dangerous to approach at night; they lie about 12 miles east-north-east of the Lucipara islands. The northernmost of them is shown on the chart in the position given; but was reported by H.M.S. *Penguin* to be 3 miles further East. The others lie, respectively, 3 miles southward and 1½ miles south-westward from it. They are uninhabited, but are visited by turtle fishers from October to December. There is a well of drinking water on the north side of Mai, the southern and largest island.

Chart 942b, Eastern archipelago, eastern portion.

Banda islands, *see* page 151.

Mano or Bird island, lying about 64 miles south-south-east of Great Banda island, is about one mile long north-north-west and south-south-east, and half a mile wide, rising like a prism with its sides sloping from the sea at an angle of about 30° to the summit, which is 880 feet high. On the southern side there is an open crater, the east side of which has fallen in, and whence sulphurous vapour freely escapes; the lower part of the northern side is wooded, but on the higher slopes the trees have been killed. A coral bank projects 2 cables from the north-north-west point, where there is a black sand beach; the rest of the island is steep-to.

CERAM LAUT.—"Ceram out to the sea" is a cluster of islands on one coral reef, 18 miles long, which, as usual, is very shoal at the edges, and drops at once into deep water. Gisser and Kiliwaru islets to the westward and the three Goram islands to the east-south-east are included in the group. The most important islands are Gisser and Kiliwaru (described in Chapter III.), separated from each other by a narrow channel, which affords good anchorage in both monsoons in a depth of 10 fathoms, sand and coral.

This group, together with the Matabela islands, form the subdivision Ceram Laut and Goram, belonging to the Ceram district, and are governed by a Posthouder, whose head-quarters are at Gisser.

The population of the group in 1882 was given as 2,000, all of whom are Mohammedans. They are employed in fishing, agriculture, boat-building, and the manufacture of hatchets, which are in great demand in the more southerly islands. The principal article of export is trepang, but the islands also produce sago, sugar cane, cocoanuts, and several kinds of wood.

Ceram Laut (*Lat. 3° 53′ S., Long. 130° 55′ E.*), the largest island of the group, is high and hilly, and had on it, in 1898, a remarkable tree, 428 feet above the sea, which makes a good mark. On the south and east sides of the island are five villages, and the population numbers about 500. The other islands on the reef are low, except Kidan, which is high. View *a*, at page 162.

Kon or Gono islets are described in the Dutch Sailing Directions as the most easterly on the reef, but the chart shows a 10-fathoms channel between these islands and the Ceram Laut reef.

The Goram islands consist of Suruaki, Goram, and Manavoka. They are considerably higher than the Ceram Laut islands, and also more fertile; they furnish excellent kinds of wood. The inhabitants are estimated to number about 9,000, and are Mohammedans; they are quarrelsome and warlike.

Suruaki (Panjang), the lowest island of the group, is hilly in the centre, and has extensive swamps on the west side. There are four villages, with a population of about 300. The island is surrounded by a reef, leaving only a narrow passage to the north between it and Kon islets reef; it is not advisable to attempt this passage, but the

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

channels between the Goram islands are safe. Anchorage was found off Wiseleat village, on the north side, in 24 fathoms, at over one mile from the shore and 130 yards from the steep-to reef, with a hawser to the latter to prevent driving.

Goram (Gorong) itself, the easternmost, is about 7 miles long, north and south, and about 4 miles broad; the centre is high, rising to 1,019 feet, but the coast is low and fringed by reefs which dry at low water. The island has 50 villages, with a population of about 6,000, and carries on a fair trade with New Guinea. View *f*, at page 154.

Plan of Ondur road on 3440.

Ondur road.—During the south-east monsoon anchorage may be had on the western side of Goram island, between the reefs which extend 4 cables off and the shore near the village Ondur, in 10 to 16 fathoms. The entrance to this anchorage may be made by bringing a small round hill, higher than the adjacent hills, to bear N.E. by N., and then steering for it on that bearing. Two leading beacons, consisting of a stone pyramid on the beach and a ball beacon on the reef, in line N. 68° E., lead through the passage, 1¼ cables wide, between the reefs to the anchorage.

Plan of Kailakat road on 3440.

Kailakat road (*Lat. 4° 2′ S., Long. 131° 26′ E.*).—During the north-west monsoon there is anchorage off Kailakat, in a small bay on the south-east coast of Goram island, in a depth of 17 fathoms, but here a local pilot is required, as the bay is obstructed by reefs.

Chart 942b, Eastern archipelago, eastern portion.

Manavoka, the southern island, is the highest of the group; the north-west part rises to a height of 1,152 feet and the south-east part is nearly as high, the two parts being separated by low land. The southern mountain, when seen from east or west, shows as a table top, but from north or south appears as a peak. From the south-east point a large reef extends some distance south-eastward, and a reef surrounds the north-west end of the island; elsewhere the island is steep-to. View *g*, at page 154.

There are 10 villages, and a population of over 2,000.

Anchorage.—There is no good anchorage off Manavoka, but off Kaliobas village, at three-quarters of a cable from the shore reef, the depth is 24 fathoms. In front of Amar village there is anchorage in 12 to 14 fathoms, sand, and along the south-east side of the island several anchorages are found. A little northward of Sera village, a depth of 16 fathoms was found half a cable outside the reef.

General charts 942b, 2759a, 1263

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

The MATABELA ISLANDS are under the control of the Posthouder at Gisser. They are sparsely inhabited, carry on very little trade, and afford no safe anchorage. Inga (*Lat. 4° 20′ S., Long. 131° 33′ E.*), the northern islet, lies nearly 14 miles south-east of Manavoka, and is covered with shrubs; the channel between them is clear.

Watu Bela and **Inga** are connected by a reef, and are both high islands, the former having an elevation of 688 feet, and covered with heavy timber. There are seven villages, and a population of about 600, one-third of whom are Mohammedans and the rest heathen.

Kasiwui, or Corsair, is the largest of the whole group, and 1,165 feet high near the south point. It has a heathen population of 100, divided over 13 villages. View *b*, at page 162.

There is anchorage at Temer Timor, eastward of the south point of the island, in 12 fathoms, coral, with Kurkap islet bearing S. 79° E. and Baan islet S. 2° E.; also at Temer Barat, on the west side of the south point, in 27 fathoms, sand, with a hawser to the shore, as the bottom slopes steeply. There is no good anchorage anywhere in the Matabela islands

Baan islets are two small uninhabited islets, 269 feet high, and surrounded by a reef, lying about 3½ miles south-south-east of the south point of Kasiwui. Kurkap island, 5 miles east-north-eastward of Baan, is a small sandy islet 118 feet high, surrounded by a reef on which some rocks show at low water, generally marked by heavy breakers; at about one mile south-eastward of the islet is a detached reef. The *Triton*, in 1828, passed between Kasiwui and these three islets and observed no dangers.

Towa (Tioor) **island,** about 6 miles south-south-east of Baan islet, has two summits, the southern of which, 1,280 feet, is the higher. There are four villages and a population of 400, mostly Mohammedans.

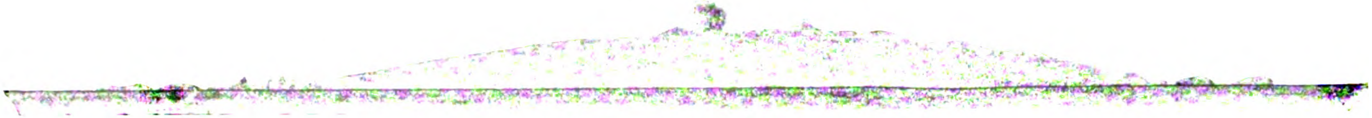
Off the village of Rumah Lusi, on the north-east side of Towa, there is anchorage in 24 fathoms, sand, with the points of Towa bearing S. 49° E. and S. 28° W., and the village South, at a distance of over a quarter of a mile from the shore and nearly a cable from the edge of the reef; there is a sand-beach at the village. At the village of Lebon Minjar, near the south-west point of Towa, good drinking water can be obtained. View *c*, at page 162.

Shoal.—A shoal, with 4 fathoms of water on it, lies about one mile off the eastern side of Towa, with Uran islet bearing N. 88° E.

The *Nautilus*, in 1838, passed between Towa and Baan without observing any dangers, though the native pilots on board reported the passage to be foul.

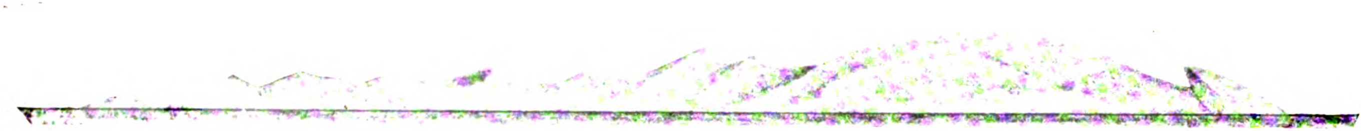
General charts 2759a, 1263.

To face page 162.]

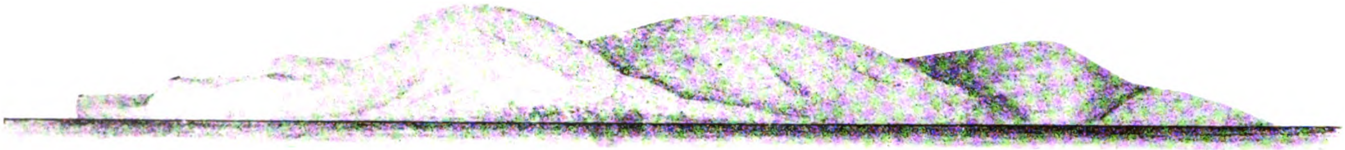


High tree, E. ½ S.

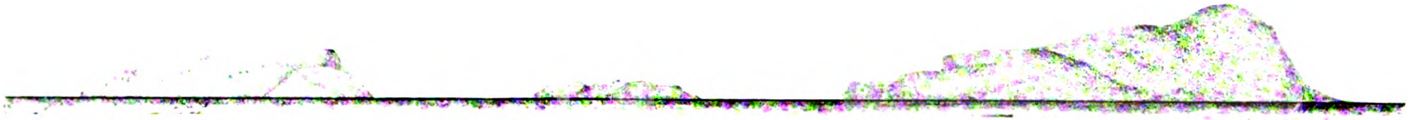
Ceram Laut.



Kasiwui island, about N.E. by N. 12 m.



Towa (Tioor) island, E. by S. ½ S. 14 m.



Bui. *Kainos.* *Kaimeer.*

Bui, Kainos and Kaimeer islands from the west.

Uran islet, 98 feet high, 8 miles N. 72° E. of the south point of Towa, is small, sandy, and wooded, and surrounded by a reef.

A bank with 9 fathoms on it is situated 6 miles S. 4° E. from Uran islet. The *Mataram* steamed repeatedly over this position without seeing the bank.

Bui and Kur islands.—At 29 miles S.E. ¾ S. from Towa, the southernmost Matabela island, there is the northernmost island of a group consisting of Bui, Kainos, Kaimeer, and the larger island Kur. The islands are all of them wooded. Bui, 231 feet high, the northernmost, and Kainos, 133 feet high, are not much more than wooded rocks, and are connected with each other and with Kaimeer by a reef; Kaimeer, 457 feet high, lies about 3 miles southward of Bui; it has two hamlets on the west side, and is thinly wooded. It produces iron wood, and some cocoanut trees grow on the beach. View *d*, at page 162.

Kur (*Lat. 5° 23′ S., Long. 132° E.*), the southernmost island of the group, is about 5 miles long north-east and south-west, and rises in the southern part to a height of 1,314 feet. The highest summit of the northern part is about 800 feet and appears light-coloured and bare; between it and the north point is a plateau about 300 feet high, where are extensive gardens. The land rises steeply from the sea on the north and east sides, but on the west side is a flat more or less wide, where all the villages are situated, with the exception of Heriet on the south-east side. The southern part of the island is very uneven; the south point shows a broad cleft, which continues as far as the sea, and the coast hills rise in a succession of terraces, by which the island is easily recognised. View *a*, at page 182.

The island is divided into two districts, each under a **rajah**, of which Kilmaas is the northern and Kilsui the southern. The chart shows a reef fronting the north-west and southern parts of the island; it extends a considerable distance northward from the north point.

The population is Mohammedan and numbers about 1,000, including the inhabitants of the islands to the northward.

Anchorage.—On the west side of the island there is anchorage off Kilsui village in 15 fathoms, one cable outside the 3-fathoms line, with the flagstaff bearing S. 81° E. There is an inlet in the coast reef here which makes a good harbour for small craft. On the reef are several fish traps.

There is also anchorage in about 17 fathoms close northward of Sermaaf, about 2 miles northward of Kilsui.

Three Brothers are a group situated 11 miles south of Kur, consisting of three islets lying about 4 miles from one another; the two western islets are shown surrounded by a coral reef, and the passages between the islets are free from danger.

Winin, the north-western islet of the group, about half a mile in diameter, is 98 feet high, covered with trees and surrounded by a reef. It is visited in the planting and harvest time by people from Kur, who have gardens here.

Mangur, the north-eastern and largest, 1¼ miles long and nearly one mile wide, is 162 feet high, and lies 2½ miles east from Winin island. It is inhabited.

Fadoh islet, the southernmost, is about one mile in diameter, 492 feet high, and lies 4½ miles south-westward of Mangur; this island is inhabited.

Chart 2264, Kei or Ewaf islands.

TIANDU, or Tajando, ISLANDS.—This group consists of three large and four small islands, all of coral formation and densely wooded, with a few outlying rocks; they are surrounded by extensive reefs. They lie in a north-east and south-west direction, and extend 19 miles in length, and about 8 miles in width. The south-westernmost island, Taam, is 556 feet high and round-backed.

The other islands are hilly but low, and they can be seen at a distance of from 12 to 15 miles.

The population amounts to about 1,300, all fanatical Mohammedans; they are employed in building praus and making earthenware. The woods afford good timber.

Tajando or Tiandu (*Lat. 5° 33′ S., Long. 132° 19′ E.*), the northern island, 266 feet high, and Walir, 167 feet, lie on the same reef.

Northward of Tanjong Matot, the north-eastern extreme, a small rocky island named Matochanat lies on the shore reef and off Tanjong Tajando, the north-west extreme, are several small islets. Tajando is inhabited and has three villages, Tajando, Rahangiar, and Ohiïl; Rahangiar is situated at the head of a bay on the north side of the island, which affords good anchorage. The chart shows a detached reef in the bay with deep water around. The village is surrounded by a wall about 10 feet high, composed of loose blocks of coral.

Heniaar or Kelapa island lies on the reef eastward of Walir, and is inhabited. Watleu is a small rocky islet on the reef southward of the south point of Walir.

Ree and Reejanat islets lie on the same reef close westward of Walir; the former is cliffy, the latter is a wooded sandbank.

Nusreen and Nuniai are low sandy islets, wooded chiefly with cocoanut trees. They lie south-south-westward of the south point of

Walir, on the northern part of a reef which extends 5 miles north-west and south-east, with a least width of 3 miles. South-eastward of the south end of Nusreen lie a sandy islet and a couple of rocks. The channel between Walir and Nusreen and also that between the reef of Nusreen and Taam is quite clear.

Taam is cliffy except at the north-east point, where a low sandy spit projects. On the west side are two villages; Ngurhin is Mohammedan and Ohitum heathen. The inhabitants number about 400, and are under a rajah.

Dangers.—The following shoals lie off the northern end of Tiandu, the northern island, situated from Tanjong Tajando:—Huisman rock with 3 fathoms on it, 5¾ miles N.W. by W. ¾ W.; a reef with less than 3 fathoms, discovered by the s.s. *Raaf*, 1⅔ miles N. 13° E.; Telegraaf rock with one fathom, 5 miles N.E. ¾ E.; and Rembang shoal, 10 miles N.E. ¾ N. The least depth found on Rembang is 15 fathoms, but there is probably much less, as there are heavy overfalls over it. The positions of Telegraaf rock and of Rembang are doubtful. Within the space bounded by these shoals, there is reported to be a wide area containing dangerous ground.

Anchorages.—Between Tajando and Walir islands there is a channel on the east side of the reef with a least depth of 3¾ fathoms, giving access to a cove where small vessels can find good anchorage at all times.

Opposite this cove, on the western side of the reef, a bay is formed which affords good anchorage for large vessels in the east monsoon. In this bay is Waratneu island, surrounded by a large reef, and at one mile W. by S. ¾ S. from Ohiïl village is a small detached reef.

There is anchorage off the west side of Taam island in 18 fathoms at three-quarters of a cable outside the 3-fathoms line, with the extremes of the island bearing N. 46° E. and S. 28° E. The bottom is steep, and it is recommended to lower the anchor with 20 fathoms of chain when approaching.

KEI or EWAF ISLANDS (*Lat. 5° 45′ S., Long. 132° 45′ E.*) consist of the large island of Nuhu Yut or Great Kei, the island Nuhu Roa, which includes Kei-Dulah, and a number of islets, lying about 75 miles south-eastward of the Matabela islands and about 70 miles from the coast of New Guinea. The islands are almost entirely formed of coralline limestone, clothed with magnificent forests which contain an abundance of fine timber trees, some of which are said to be superior to the best Indian teak, and cocoanut trees grow in abundance. The islands are all, with the exception of Nuhu Yut, comparatively low, and most of them are encircled by extensive shoals. On

Nuhu Yut are numerous small streams, which are generally dry in the east monsoon; in the other islands water is obtained from wells. There are no roads, but some of the villages are connected by footpaths.

The population is estimated at over 20,000; about one-third are Mohammedans; there are a few Christians, and the rest are heathen, who are the original inhabitants, and who have the characteristics of a Malay-Papuan race. They are well disposed to strangers; they live in villages on the coast and are famous boat builders, both for their own use and for sale, and there are good blacksmiths and goldsmiths among them; maize and fruits are cultivated, and the waters between the islands abound in fish, but the natives seldom go outside the reefs and fish in no deeper water than 10 fathoms. There are wild pigs on the islands.

Trade is carried on by barter. There is a good traffic with Banda, Ceram, and the surrounding islands in trepang, turtle, cocoanuts and cocoanut oil, timber, &c.

The Kei islands form a sub-division of the residency of Amboina. Nuhu Yut is under the government of a Posthouder, and Nuhu Roa or Little Kei is under that of a Controleur, who, at the same time, has the superintendence of the whole sub-division.

NUHU ROA, including Kei-Dulah, the north-eastern and smaller portion of it, is 26½ miles long in a north and south direction, and from 7 to 12 miles in width; it is of irregular outline with many deep indentations, and several islands lie close to its shore, of which in places they almost form a part. The island is covered with trees, and is generally low, though there are a few moderate elevations.

North coast.—The north coast of the larger part of Nuhu Roa, which extends from the point near Sietohoi village to Tanjong Ngidiun, 6 miles westward, has cliffs and sand beaches alternately. In the middle is a large bight; an extensive reef fronts the coast, which, however, extends only one cable from Tanjong Ngidiun. There are several villages on the shore.

Reefs and islands north of Nuhu Roa.—Ender rock (*Lat. 5° 20′ S., Long. 132° 40′ E.*), the most northerly danger off Nuhu Roa, is a coral patch half a mile in extent, with a depth of 3¾ fathoms, and may be distinguished by the discoloration of the water; it lies 6 miles N. by W. ¼ W. from the north extreme of Maas island. At half a mile northward of Ender rock is a patch of 9 fathoms.

Van Speyk reef, situated about 3½ miles N. 32° E. from the north end of Maas island as charted, but the position of which is doubtful, is reported to be about 3 cables long north-west and south-

Chart 2264, Kei or Ewaf islands. Var. 3° E.

east, to have probably less than 2 fathoms on it, and to be visible from the discoloration of the water and the rippling of the tide.

Batavier reef, the position of which is doubtful, is charted 2¼ miles N. 53° E. from the north end of Maas island. It is reported to be about one cable in extent, and to be marked by discoloured water.

Datu reef, about three-quarters of a mile in extent, lies half a mile northward of the north end of Maas island; the least depth on the reef is said to be 2½ fathoms.

Dangerous ground.—The area included between Van Speyk, Batavier, and Datu reefs is dangerous ground.

Plan of Kei Dulah harbour on 1460.

Baeer and **Maas** are two wooded islands lying about 8 miles northward of the large part of Nuhu Roa. Baeer is rocky, steep, and 162 feet high. The coast of Maas is rocky on the south-west, and a sand-beach elsewhere. The islands are one-third of a mile apart on the same reef, which extends 2¾ miles eastward and 1½ miles southward from Maas. Sua islet lies on the southern end of the reef, and Watlora islet about 2 cables eastward of Maas.

Rumadan is a low wooded island divided in the middle, and forming two at high water, lying 1⅓ miles northward of Du Roa island and north-westward of the north point of Kei Dulah island. Wide reefs extend 3 miles westward and 2¼ miles north-eastward from Rumadan, and between the north-west end of the western reef and Baeer island is a detached reef over one mile in extent.

Du Roa island (*Lat. 5° 32′ S., Long. 132° 42′ E.*), or Kei Dulah Laut, lying south-westward of Rumadan and 2¼ miles northward of the north-east point of the large part of Nuhu Roa, is the largest of the smaller islands.

It is surrounded by a reef which extends 2 miles westward and two-thirds of a mile southward from the island; on the southern reef is an islet. Shoal water extends 6½ cables eastward from the north-east point, and two detached reefs, the southern of which is over half a mile in extent, lie off the east end of Du Roa island. Dulah Laut is a thriving village on the north-east side of the island, and on the east end is Tawinohoi village.

Du Roa is separated from the reef of Rumadan by a channel 3 cables wide, with a least depth of 7 fathoms, sand and shells. Dranan islet, a low sandbank, covered with vegetation, lies in the eastern entrance to the channel, half a mile southward of Rumadan.

General charts 2264, 942b, 2759a.

Ut island, 2 miles south-westward of Du Roa and about 8 cables from the north shore of Nuhu Roa, is narrow, with rocky ends, the middle part consisting of sand. The rocky islet of **Krus** lies off the north-west point, and a small village is on the eastern side of Ut. A reef extends about 1½ miles westward from the island, but it cannot always be distinguished by the colour of the water. Several shoal patches lie between Ut and the north shore of Nuhu Roa.

Du Roa strait is the channel between Du Roa island and the north side of the large part of Nuhu Roa. On the north side is the reef extending westward and southward from Du Roa island and also a detached reef lying southward of the shore reef; they are marked by two beacons, *see* below. On the south side are Krus, Ut, and Ubur islands, and a detached reef dry at low water lying north-westward of the latter. The navigable width of the strait is half a mile. For Directions, *see* page 175.

Shoal.—A shoal with a least depth of 4 fathoms lies in the western approach to Du Roa strait, at a distance of 3 miles S. 79° E. from the north point of Godan island.

A bank of 8 fathoms extends north-westward from the reef of Ut island, and there are other patches of 8 fathoms in the western entrance; elsewhere the water is deeper.

Beacons.—Two iron beacons surmounted by black truncated conical topmarks, have been established on the southern edge of the shoals on the northern side of Du Roa strait.

Tidal streams.—The flood stream in Du Roa strait sets eastward and the ebb westward, with a velocity of over 2 knots an hour at springs.

WEST COAST.—The western coast of Nuhu Roa trends south-south-eastward for about 21½ miles from Tanjong Ngidiun to Tanjong Doan, and is irregular in outline.

Tanjong Ngidiun (*Lat. 5° 36′ S., Long. 132° 35′ E.*), the north-western extreme of the island, is a narrow, well-defined projection, formed by a hill 261 feet high.

Between Tanjong Ngidiun and the point 5 miles southward, the coast forms a bight with sand beaches and cliffs alternately, the latter being from 30 to 40 feet high. In the middle of the bight is a small cove with a depth of 5 fathoms, the approach to which is closed by the coast reef. The coast from the point westward of Ngilgof village bends eastward and forms a tongue of land, on the eastern side of which are two shallow coves, nearly closed by reefs, communicating with each other by a narrow entrance; afterwards the coast trends southward.

Chart 2264, Kei or Ewaf islands. Var. 3° E.

Ngilgof and Ngamar are thriving heathen villages, the inhabitants of which are engaged in boat building.

Totoad bight.—Southward of Sulaer village and about 8½ miles from Tanjong Ngidiun the coast forms a wide bight, narrowing to a creek, which penetrates in a southerly direction to the south coast of the island. The bight, which receives its name from the principal village on its shores, is divided into two parts, both affording good anchorage, by Wahru island. In the northern part, where the depths range from 6 to 21 fathoms, there is a small detached reef, and a long narrow reef lies farther eastward near the coast. The southern part has depths of from 9 to 15 fathoms over a width of half a mile, and is the anchorage generally chosen. Totoad (*Lat. 5° 45′ S., Long. 132° 39′ E.*), on the southern side of the entrance to Ewu creek, is the residence of the Rajah of the district; off the point westward of the village lie one or two small islets.

The creek which penetrates southward from Totoad bight divides in its upper part into three arms, nothing more than swamps covered with mangroves. The eastern arm joins a bay on the south coast, cutting off the south-western part of the island. The entrance to the creek, generally named Ewu creek from a village on its eastern side, is much obstructed by a reef that dries; the channel lies between an islet and the shore at Totoad, and has depths of from 7 to 10 fathoms and a least width of 2 cables. Within the entrance the depths are from 4 to 7 fathoms, mud, decreasing gradually to 1½ fathoms about 5 miles up; the banks are covered with mangroves and swarm with alligators. At Ewu village there is a stream with a waterfall.

From the point near Totoad, the coast trends southward for 3 miles, the first half being sandy and the second cliffy; off the latter part the shore reef extends 7 cables. The coast then becomes sandy for 2½ miles, forming a bight two-thirds of a mile in depth, in the northern part of which is a detached shoal of 3 fathoms, and off the southern point of the bight the chart shows a sandbank with a shoal north-westward of it; there is good anchorage in this bight. The coast then becomes rocky, and is fringed by a very narrow reef to Tanjong Arat, which is cliffy. Between Tanjongs Arat and Doan is a bay nearly filled with reefs. Besides those mentioned, there are numerous other villages on the west coast of Nuhu Roa.

Islands westward of Nuhu Roa.—A mass of islands and reefs, some of the former about 250 feet in height, lie off the west coast of Nuhu Roa, extending to a distance of from 7 to 13 miles from the shore. Their positions will be best understood by reference to the chart, but particulars of a few are given on the next page.

General charts 942b, 2759a.

Chart 2264, Kei or Ewaf islands. Var. 3° E.

Godan island (*Lat. 5° 34′ S., Long. 132° 34′ E.*), 1¾ miles north-westward of Tanjong Ngidiun, is a densely wooded, sandy island, about half a mile in extent and 123 feet high to the tops of the trees; the south point is rocky. It is surrounded by a reef, which extends two-thirds of a mile south-south-westward and half that distance northward from the island. Er islet, about 8 cables westward of Godan, is a low, wooded sandbank, surrounded by a reef which extends 1¼ miles westward from it. A small well on the north-east side furnishes good drinking water. These two islands are visited by the natives from time to time for turtle eggs and fruit.

Northward of Er islet is a large detached reef over a mile in extent, the outer edge of which is 5¼ miles north-westward of Tanjong Ngidiun. The Netherlands war-vessel *Siboga* anchored on the north side of this reef in 12 fathoms, coral bottom, and approached the anchorage with the hill inside Tanjong Ngidiun in line with the highest point of Godan.

An extensive reef on which are several islets lies 7¾ miles southward of Er; the western edge of this reef is nearly 1½ miles from the islets, and Mitfeer, a patch of 5 fathoms, lies 3 miles south-westward of Nai (186 feet high), the northern islet on the reef.

Ur and **Utier** are two islands, 266 and 157 feet high respectively, lying on the same reef, about 7 miles westward of Tanjong Arat. On Ur is a village of the same name, inhabited by people who, in civilisation, are far behind those of the other islands; they are much darker in colour, some being as black as negroes, and most of them have woolly hair.

Nuhu Taa island, about 3¼ miles westward of Utier, appears to be low, and is surrounded by a reef which extends two-thirds of a mile westward; Var islet lies on the reef southward of Nuhu Taa.

Kei-Tanimbar, the south-western island, about 14 miles west-south-west from Tanjong Doan, is 3½ miles long north-east and south-west and 84 feet high in the south-western part. Its shores are rocky, except on the north side, where there is a large bay, and the island is surrounded by a wide reef that partly dries at low water; near the north point of the reef is Warna islet. Atnebar village, situated on the 84-feet hill above mentioned, is impregnable to native enemies. In front of the village is a small harbour enclosed by piers of coral stones, the entrance to which is marked on either side by two idols; it is quite dry at low water, and is also used as a fish weir, the entrance being closed at high water by lathwork. The inhabitants, about 350 in number, come little in contact with the natives of the other islands, with whom they stand in no good repute, being savage and pugnacious.

General charts 942b, 2759a.

Chart 2264, Kei or Ewaf islands. Var. 3° E.

Channels.—The various islands and groups of islands above mentioned have deep channels between them, which are easily navigated if the reefs are visible. A stranger will have difficulty in recognising the different islands except by their size.

To approach the anchorage in Totoad bight from the northward, steer south-westward between Godan and Ngaff islands until the west end of Nai islet bears South, when steer for it on that bearing until Gelanit hill bears N. 85° E.; steer then straight for Liek island, S. 30° E., until the north side of Tonguin bears S. 79° W., when course may be altered for the anchorage, avoiding the 2¼-fathoms shoal south-westward of Wahru island. The approach from the southward offers no difficulty.

The channel between the above islands and reefs and the Tajando islands to the westward is 8½ miles wide in the narrowest part and clear.

Reef.—At about 6½ miles east-south-eastward from Kei-Tanimbar island a large reef is charted, the position of which is doubtful.

Plan of Kei Dulah harbour on 1460.

East coast.—North-eastward of the point near Sietohoi village is Ubur island, lying on the shore reef; it is wooded with fine trees, and has a patch of sand on its north-east point. Kran islet, wooded, lies southward of Ubur.

From the point just mentioned a steep and rocky coast trends southward 3½ miles to Gelanit bight, and is fronted by a reef extending 1½ miles eastward, on which are some islets.

Gelanit bight, the entrance to which is fronted by Fair island, consists of two basins, the eastern of which is approached by a narrow channel with a depth of 5 fathoms, but with from 2 to 4 fathoms at the entrance, lying between the south end of Fair island and the point near Vatek village; the entrance westward of Fair island is filled with reef, and can only be used by small praus. This basin has depths of from 6 to 11 fathoms, and communicates with the inner or western basin by a narrow channel with a least depth of 3 fathoms. The western basin is about 2 miles long north and south, 4 cables wide at the narrowest part, and has depths of 8 to 12 fathoms; on the west side is Gelanit hill, 364 feet high; the other sides are low and rocky.

Coast.—From Vatek village (*Lat. 5° 39′ S., Long. 132° 43′ E.*), a cliffy coast trends southward about 2¾ miles to Vaan village. Langur village, about a mile south of Vatek, is Christian, and a Roman Catholic mission is established there; a great part of the inhabitants of Vaan are also Christians. Southward of Vaän is the entrance to a

Plan of Kei Dulah harbour on 1460. Var. 3° E.

narrow inlet extending about 3 miles southward, with depths of from 11 to 17 fathoms; an islet lies in its southern part. Watlus island forms the northern part of the eastern side of the inlet, the entrance to which, between Watlus and the shore to the westward, is narrow, with a depth of 8 fathoms. A reef surrounds Watlus island and extends north-north-eastward 6 cables from its northern end; it also connects it with the shore to the southward.

On the eastern side of the peninsula southward of Watlus island is a bight, in which are Daar or Papua and Bararan islands, separated from each other by a shallow channel closed by reef at the northern end, as is also the channel between Bararan and the coast, in the southern part of which are depths of 4 and 6 fathoms. Daar island is surrounded by reefs which extend 8 cables eastward from the north point, and from one to 3½ cables from the east side, continuing southward and closing the passage southward of the island, except for a shallow channel which becomes deeper to the westward, and south of Bararan has a depth of 10 fathoms.

Chart 2264, Kei or Ewaf islands.

South-westward of Bararan island a very narrow shallow passage communicates with a basin about 2½ miles in length north and south and one-third of a mile in width, with depths of from 5 to 9 fathoms; in the southern part is a patch of one fathom.

Reefs.—A narrow detached reef 2 miles in length lies southward of the entrance to Rosenberg strait, at 1⅓ miles eastward from and parallel with Daar island; at 1½ and 3½ miles southward of the reef are small coral patches, steep-to, at 1¾ and 1½ miles, respectively, from the shore to the southward of Daar.

Coast.—From the south end of Bararan island the coast trends south-eastward and southward 4¾ miles to near Abean village, and then south-south-westward 6¼ miles to Tanjong Hoar, the south-eastern extreme of Nuhu Roa, and is low, consisting of rocky cliffs and sand beaches alternately. There are several villages on the coast, which is bordered by a reef extending about three-quarters of a mile off-shore in places.

South coast.—From Tanjong Hoar, which is low and cliffy, the coast trends westward for 3 miles to the entrance of a bay on the west side of which is Tanjong Doan. The shore is a low sand beach, on which are many cocoanut trees, and also Danar village with a mosque; it is bordered by a reef which extends 8 cables off. The bay on the east side of Tanjong Doan extends northward nearly 2 miles, but there is no information regarding it.

General charts 2264, 942b, 2759a.

Chart 2264, Kei or Ewaf islands. Var. 3° E.

Tanjong Doan, the south extreme of the island, is high and may be recognised by the yellow red colour of its rocks. Shoal water extends a quarter of a mile southward. Noiko islet lies half a mile south-south-eastward from the point.

Mitroa shoal, with a least depth of 4¼ fathoms, lies 2½ miles southward of Nuhu Roa and S.E. ½ S. 3 miles from Tanjong Doan. Southward of the Mitroa there is probably shoal water.

KEI DULAH island, the north-eastern part of Nuhu Roa, is hilly in the southern half; the highest point, 266 feet, is reached by a hill eastward of Dumar village on the west coast. The northern half of the island is flat, except for a ridge of low hills on the north-west side. Eastward of Ngade village are two small lakes, one of which has a depth of 7 fathoms.

Plan of Kei Dulah harbour on 1460.

Tanjong Serbat (*Lat. 5° 31′S., Long. 132° 46′E.*), the northern extreme of the island, is low, sandy, and covered with casuarina trees. A shoal extends three-quarters of a mile north-eastward from the point, with a patch of 2 fathoms close outside it.

Tegal shoal, with 7 fathoms on it, lies 2¾ miles N. 19° E. from Tanjong Serbat.

West coast.—From Tanjong Serbat to Tanjong Lobi, a distance of about 4½ miles south-westward, the coast is a low sand beach broken by cliffs in one place, about a mile northward of Dulah (Ké Dulan) village. This village is, after Tual, the principal village of the group, and is inhabited by fanatical Mohammedans. A jetty built of loose coral rock extends from the front of the village to the edge of the shoal water.

From Tanjong Lobi, off which is an islet of the same name, to Tual village, a distance of about 3½ miles, the coast trends southward, and is steep and cliffy, interrupted about half-way by a shallow bay, on the sandy shore of which are four villages, the southern being named Dumar; near the northern village is a small stream. The coast reaches its greatest height, 70 feet, at Tual; farther south it is rocky and has two villages on it. Just southward of Tual is a small islet close to the shore.

Anchorages.—Off Tamedaan village, about half a mile south-westward of Tanjong Serbat, there is anchorage in 14 fathoms at about half a mile from the shore; there is also anchorage about 3½ cables to the north-westward.

Kei Dulah harbour is a safe anchorage only in the east monsoon, but the water is rather deep. In the west monsoon violent squalls occur, accompanied by a short sea; vessels should then anchor temporarily southward of the reef that lies eastward of Du Roa island.

The *Challenger* anchored off Dulah village in 19 fathoms a quarter of a mile from the shore, and about a cable from the edge of the shoal water, with the mosque at Dulah bearing East and Lobi islet S.S.W. ¾ W.

Tual harbour (*Lat. 5° 38′ S., Long. 132° 43′ E.*), on the west side of Kei Dulah island, and 4 miles south-south-westward of Dulah village, is a capacious and well-sheltered anchorage formed by Kei Dulah, Fair and Ubur islands. The best anchorage is off Tual village in a depth of 10 or 11 fathoms, good holding ground, with the point on the west side of Tual bearing S. by E. ½ E.; a reef extends one cable northward of this point.

The limits of Tual road are, a line drawn S.W. from the point by Dumar village, and a line drawn N.E. from the south-east point of Fair island.

Reefs.—Beacons.—At 1$\frac{4}{10}$ miles south-westward of Lobi islet and 4½ cables from the shore of Kei Dulah island, is a reef that dries at low water, marked by an iron beacon, surmounted by a black truncated cone.

A narrow reef, half a mile in length north and south, lies half a mile westward of Dumar village, and is marked by two white ball beacons, one at the north end and the other at one cable from the south end.

DIRECTIONS.—Kei Dulah harbour is not readily distinguished from the north-eastward, but the following marks are useful when approaching from that direction:—The eastern point of Nuhu Roa; Gelanit hill, 364 feet high, at the northern end of the western part of Nuhu Roa; the little wooded islet Kran, lying close southward of Ubur island; and Lobi islet, on the shore of Kei Dulah eastward of the north end of Ubur.

The channel from sea to Tual, bounded on the east side by Kei Dulah and on the west by Rumadan, Du Roa, and Ubur islands, and the reef extending from Fair island, is 2 miles wide at the entrance and narrows to about 2 cables northward of Tual; the depths are irregular, and vary from 44 fathoms in the entrance to 7 fathoms. In the centre of the channel between Dranan islet and Tanjong Serbat, is a reef with 5 fathoms over it.

From the northward approach with Tanjong Serbat bearing S. 3° E. until Lobi islet bears S. 27° W., when alter course for it, keeping it

Plan of Kei Dulah harbour on 1460. Var. 3° E.

on that bearing, which leads north-westward of Tegal shoal of 7 fathoms, and towards Dulah anchorage.

If proceeding to Tual, when off Dulah, steer for the sand patch on the north-east point of Ubur island until Tual mosque is open westward of the point to the northward of it. Steer in on this mark, which leads westward of the black beacon, remembering that the beacon stands on the middle of the reef, not on its edge. The mosque is difficult to make out; a better mark is the zinc roof of the sawmills just open westward of the point to the northward.

Having passed the black beacon haul southward half a point to pass between the white beacons and the reef off Dumar village, after which keep about 1½ or 2 cables off the shore of Kei Dulah island to the anchorage.

Charts 2264, 1460.

To enter Tual harbour from the westward by Du Roa strait, steer eastward until the north-east point of Kran islet is just open northward of the north-east point of the western part of Nuhu Roa, S. 64° E., when steer towards it until the somewhat high south point of Godan island bears S. 85° W., or Dulah village N. 85° E. Steer N. 85° E. towards the latter, with the lead going and keeping in a greater depth than 6 fathoms, to avoid the reef north-westward of Ubur island; round that island at a distance of at least 3 cables, and proceed as above directed for Tual.

When proceeding westward through Du Roa strait the above directions should be reversed, and when the north-west end of Ngaff island opens of Tanjong Ngidiun, the course may be altered to pass between that point and Godan island if required.

Plan of Kei Dulah harbour on 1460.

Tual (*Lat. 5° 38′ S., Long. 132° 43′ E.*) is the principal village of the Kei group and the head-quarters of a Controleur. It is situated in a valley on a small bay on the west side of Kei Dulah island, and is a thriving place, with several foreign traders; the houses are good and form regular streets. A company has a steam sawmill at Tual. There is a stone landing pier for boats, with a white cupola on the outer end, and from this pier a road leads to the house of the Controleur on a hill. In 1905, the population of Tual was 802, of whom 14 were Europeans.

Westward of the village is a white shed with a small wharf, alongside which a laden boat cannot come at low water.

Supplies.—Some provisions can be procured at Tual by barter. Water is supplied by the Steam Sawmills Company at 2 florins per 600 litres for drinking and at 1½ florins for boilers, &c.

General charts 2264, 942b, 2759a.

Plan of Kei Dulah harbour on 1460. Var. 3° E.

Communication.—The vessels of the Royal Netherlands Steam Packet Company on the route from Amboina to Aru islands and Merauke, call at Tual once every four weeks, both on the outward and return voyages. *See* page 17.

Tides.—One day's observations (September 25th, H.M.S. *Challenger*), at full moon, gave the time of high water, full and change, at Kei Dulah harbour at 1h. 25m. Springs rise 7 feet.

Winds and weather.—The remarks on the winds and weather at the Aru islands apply to the Kei islands; *see* page 212.

Mr. Wallace says:—"In Timor Laut and the Kei islands, a moister climate prevails than in Timor to the westward, the south-east winds blowing from the Pacific ocean through Torres strait, and as a consequence every rocky islet is clothed with verdure to its summit."

Rainfall.—The average annual rainfall at Tual amounts to about 93 inches. December, January, February, and March are the wettest months, most rain falling in January. The driest months are August, September, and October, least rain falling in August; *see* table on page 324.

East coast.—Between Tanjong Serbat (*Lat. 5° 31′ S., Long. 132° 46′ E.*), the northern extreme of Kei Dulah island, and the point near Naam village, about 1½ miles south-south-eastward, is a bay with depths of 8 and 9 fathoms. Reefs extend 1¾ miles northward from Naam, between which and the reef off Tanjong Serbat is a narrow channel with a depth of 1¾ fathoms leading to the bay just mentioned; a village lies on the west side of the bay.

Chart 2264, Kei or Ewaf islands.

A short distance southward of the point near Naam is a small bight leading to a mangrove swamp. The coast then continues southward for 8 miles to Tanjong Vadsit, the first part being low, cliffy, and wooded, the centre part a long sand beach with four villages on it, and the southern part again cliffy, low in the north, and increasing in height southward.

Tanjong Vadsit, the southern extreme of the island, is steep and 40 feet high; off the point reefs extend southward and south-eastward 4 and 5 cables. A village lies about 1¼ miles north-eastward of the point.

The eastern side of Kei Dulah is bordered by a reef from 2 to 5 cables wide, which is steep-to, especially the south part.

Off the sandy part of the coast there is good anchorage in about 20 fathoms.

General charts 2264, 942b, 2759a.

Chart 2264, Kei or Ewaf islands. Var. 3° E.

Reefs.—Abreast Ohoiwachar village, 4 miles northward of Tanjong Vadsit, a small detached reef lies outside the shore reef.

Two reefs close together and dry at low water, lie N. 77° E. from Tanjong Vadsit and 1½ miles off-shore.

Plan of Kei Dulah harbour on 1460.

South coast.—The south coast of Kei Dulah forms two bays, bounded by hilly, wooded tongues of land. Lun bay, westward of Tanjong Vadsit, extends 3½ miles northward, with an average width of half a mile. The entrance between the reefs projecting from the points has a depth of 16 fathoms, which gradually decreases to 3¼, increasing again to 6 fathoms. The shores are steep and rocky, except at the head, where there is a flat sandy part, whence several paths lead to the interior, and are used for the transport of timber. Lem bay, the western of the two, is separated from Lun bay by a broad and high tongue of land, and has two entrances, the eastern of which, on the east side of Kielwiek island, dries at low water. The western entrance is 5 fathoms deep and gives access to a basin said to have an average depth of 5 fathoms, but with from 6 to 8 fathoms as charted; this communicates by a narrow channel with an inner basin which dries at low water.

Rosenberg strait, between the south part of Kei Dulah and the largest island of Nuhu Roa, is 1½ miles wide at the eastern end between Tanjong Vadsit and the north end of Daar island. The strait narrows to the westward, and is winding on account of the reefs extending from the shore on either side; it ends in a narrow channel with a depth of one fathom, leading northwards towards Tual.

Reefs.—In the eastern part of the strait are four detached reefs, one off Tanjong Vadsit, and the other three towards the north end of Daar island.

Chart 2264, Kei or Ewaf islands.

NUHU YUT, or Great Kei, the easternmost island, is about 48 miles long north-north-east and south-south-west, and from one to 6 miles broad, except at the southern end, where a tongue of land, about 2½ miles in length, and covered with reeds, is less than half a mile across. The whole of it is mountainous and wooded, with patches of cultivation on the slopes in places, the range traversing its centre and sloping down on either side. The coasts are high and cliffy; here and there are sandy beaches where the villages are built.

Mountains.—In the northern part of the island the highest mountains are nearly in the middle line. They are Mounts Wokra, 2,348 feet; Kaar (*Lat. 5° 23′ S., Long. 133° 5′ E.*), 2,382 feet; Bu,

General charts 2264, 942b, 2759a.

2,525 feet; and Daab, the highest, 2,628 feet. Mount Kaar has a sharp peak, Mount Bu has a rugged summit, and Mount Daab has the shape of a truncated cone. Southward of Mount Daab, the mountains are lower, and lie nearer the east side of the island, where they rise almost vertically from the sea. Mount Vakoi is very remarkable from its steep side on the south-east and from the light yellow colour of the bare limestone. Mount Siechek is a truncated cone, and Mount Warhuk, when seen from east or west, is like the back of an elephant with its head to the south. The narrow part of the island is composed of ridges from 300 to 500 feet in height, southward of which the land again rises steeply with several summits, the principal of which are Mounts Nonaibal, 1,831 feet, and Morbuit, 2,079 feet. The mountain chain runs farther southward with a height of from 1,300 to 1,700 feet to Langiar, where it descends to a ridge of an average height of 300 feet, which ends at the steep Tanjong Weduar.

North coast.—Between Tanjong Niv on the west and Tanjong Borang is Telok Wair, with depths of from 30 to 10 fathoms, which affords a safe anchorage in the east monsoon. The coast is rocky and steep, except at the head of the bay, where there is a flat part, and where Wair village is situated.

Tanjong Borang (*Lat. 5° 17′ S., Long. 133° 8′E.*), the northern extreme of the island, lies 2¼ miles E. by N. from Tanjong Niv, and is a projection northward from a mountain ridge, and is visible from a great distance. View *b*, at page 182.

Hoh bay.—Tanjong Vorwahan, consisting of steep rocks, lies half a mile southward of Tanjong Borang, and from it a reef extends half a mile northward with a least depth of one fathom. Between this reef and Tanjong Borang is Hoh bay, with a mean width of 1½ cables and depths of from 5 to 7 fathoms, which affords good anchorage in all seasons for small craft. To enter, keep about half a cable from the shore on the Tanjong Borang side.

Labuan Dabu is an opening from 1½ to 2¾ cables wide in the reef just eastward of Tanjong Vorwahan, which affords good anchorage in from 4½ to 8 fathoms. The western edge of a wood on the coast bearing South leads in.

Between Tanjongs Vorwahan and Oratu, a distance of 1½ miles south-eastward, the coast consists of rocks and sand beaches alternately. The shore reef has from one to 1½ fathoms on it with a few dry patches. Off Tanjong Oratu are the Wat naar rocks, 40 feet high, and here the coast bends southward for about 3 miles to Tanjong Ngarmin, and is steep and cliffy.

East coast.—Tanjong Ngarmin is 20 feet high; the small bay westward of it is filled by a reef; hence to Tanjong Wahadan the coast trends south-south-westward for 17½ miles. The coast range comes close to the sea, leaving here and there a narrow strip of sand beach, where villages are situated. Tanjongs Kawus, Kawas, and Kilwat are formed by spurs from this range, but project only about a quarter of a mile beyond the line of coast. Between Tanjongs Kilwat and Wahadan the land slopes gently upward to the mountain range. A reef from one to 3 cables in width fringes the shore; it is steep-to, and there is no good anchorage outside it. There are no off-lying dangers. The numerous villages on this part of the coast are under the rajah of Watlar, except Bandan Eli, which has its own government.

Tanjong Wahadan (*Lat. 5° 38′ S., Long. 133° 3′ E.*), 30 feet high, is the termination of a spur from Mount Daab. From hence to Tanjong Ebahan, 15½ miles south-south-westward, the coast curves westward, forming a bight 3 miles deep, fringed by a steep-to narrow reef. The coast is again very steep, especially in the northern part.

Tanjong Ebahan, 35 feet high, is the termination of a spur of the mountain chain, and is less sloping than Tanjong Wahadan.

Between Tanjongs Ebahan and Niruntutut the coast forms four small bays, which are blocked by reefs that dry, and as far as Tanjong Weduar it is fringed for the most part by a narrow, steep-to reef. Between Tanjongs Wahadan and Weduar are numerous villages, those as far southward as Ohoirenan are under the rule of the Rajah of Jamtil.

Anchorage.—As previously stated there is no good anchorage off the east coast of Nuhu Yut, but if necessary in the west monsoon vessels can anchor in about 30 fathoms, sand, at 3 cables from the shore reef off Ur village about 1¾ miles south-south-westward of Tanjong Ngarmin. A stream flows into the sea here, through a valley behind which is a remarkable peak; the peak in line with the middle of the valley leads to the anchorage.

Small vessels can find anchorage in an opening in the reef off Hollat village.

At the change of monsoon from west to east, when no heavy squalls or easterly winds are to be feared, vessels can if necessary anchor anywhere along the coast in from 30 to 40 fathoms, sand and stones.

In the west monsoon, the violent squalls which come down from the hills, often with the force of a hurricane, render navigation near the east coast dangerous in a sailing vessel.

West coast.—Tanjong Niv, the north-west point of Nuhu Yut, is cliffy, 30 feet high, and is formed by a gently sloping spur of the coast range; it may be recognised by Wat Enru, a rock 35 feet high, lying off it. From this point the coast trends south-south-west for 23½ miles to Bandan Ellat, and southward of Tanjong Niv is steep and high, consisting of grey rocks with numerous white patches. Mount Woho has nearly vertical sides, but southward of it the land slopes gently, and abreast Hor village has been cleared for gardens. From Hor to Laar village the coast is again very steep, but farther south the mountains stand back from the coast, leaving a somewhat hilly ground as far as Tanjong Hebri, beyond which there is a flat strip of land. At Ad village, 8½ miles southward of Tanjong Niv, is a small stream that praus can enter for a short distance; farther up is a waterfall. Southward of Tanjong Jarleier it is again steep as far as Bandan Ellat, where it slopes gently upward.

From Tanjong Niv to Wab village, a distance of 17 miles, the shore reef is narrow; farther southward it is wider and extends off from 5 to 7 cables.

The west coast is more thickly populated than the east coast, and the number of villages is much greater.

In the east monsoon vessels can anchor anywhere in 20 to 30 fathoms along this coast, as the bottom outside the reefs slopes regularly. Heavy squalls, however, are experienced off the land.

DANGERS.—Several detached shoals lie off the middle of the west coast of Nuhu Yut at about 2 miles from the shore, all of which appear to be steep-to.

Mituwat (*Lat. 5° 30′ S., Long. 132° 59′ E.*), the northernmost shoal, 1⅓ miles long north-north-east and south-south-west and half a mile wide, has a part that dries, but which covers several hours before high water; its centre lies with the north-west extreme of Nuhu Yut bearing N.N.E. ¼ E., distant 14 miles, and north point of Kei-Dulah, W. by S.

Mitduan, of similar shape and somewhat larger, is a rocky shoal which partly uncovers at low water, lying half a mile southward of Mituwat.

Mitnaloa is a shoal three-quarters of a mile in extent, the southern part of which is awash at high water, lying 1⅓ miles north of Nuhu Jaan island, and in the approach to the anchorage off Bandan Ellat.

Bandan Ellat bay.—Southward of Erlalaan village the coast forms a large bay, about 2 miles deep and 1½ miles wide, in which lie the islets of Nuhu Ru, Krad, and Sfat, all on the eastern side of the bay and connected with the shore by reefs. A light-green hill on Sfat is visible at a considerable distance from seaward, and an archway in a projecting rock on the north-east point is a remarkable object.

Nuhu Jaan island, nearly one mile long north and south, lies close northward of the western point of the bay. It is surrounded by a reef, and the northern part is steep, cliffy, and about 70 feet high. Close northward of the island is a rock with one fathom least water on it. In the bay are several rocky patches, but with the existing buoys and beacons the entrance is not difficult.

Beacons and buoys.—The dangers in Bandan Ellat bay are marked on the starboard hand entering by an iron beacon with white ball and two white conical buoys, and on the port hand by two beacons with black truncated cones.

The white ball beacon stands in 9 feet of water on the shore reef at the north end of Nuhu Jaan island, and must be passed at a distance of at least 3 cables, in order to avoid the one-fathom rock northward of that island.

The outer white buoy lies a little westward of a reef with 2 fathoms on it, and the inner white buoy on a reef with 3 fathoms.

The outer black beacon stands on a reef with one fathom on it, westward of Krad islet, and may be passed at a distance of 50 or 60 yards. The inner black beacon marks a reef westward of Sfat islet, and may be passed at 30 yards distance.

Anchorage.—The bay affords safe anchorage in both monsoons, being sheltered from all but northerly winds. In the east monsoon vessels anchor off Bandan Ellat in from 12 to 15 fathoms; in the west monsoon it is better to anchor more under Nuhu Jaan, with Reharien village bearing something westward of South. When leaving the road at night it will be useful to place a lantern on the buoy marking the 2-fathoms reef, and it is then advisable to anchor northward of the inner buoy.

Bandan Ellat (*Lat. 5° 39′ N., Long. 132° 58′ E.*), the most considerable village on the west coast of Nuhu Yut, is inhabited by descendants of Bandanese who were expelled from their island in the 17th century. Their language is different from that of the original natives, and they are Mohammedans. They are employed in boatbuilding, smiths' work, making wooden basins and pottery. The inhabitants of Bandan Eli village on the east coast are of similar origin, and have the same occupations as those of Bandan Ellat.

Supplies.—Some provisions and good drinking water can be obtained at Bandan Ellat.

Communication.—Vessels of the Royal Netherlands Steam Packet Company call at Bandan Ellat once in about four weeks on the return voyage from Merauke and Dobo to Amboina. *See* page 17.

General charts 942b, 2759a.

Chart 2264, Kei or Ewaf islands. Var. 3° E.

Coast.—From Nuhu Jaan island the coast trends south-south-westward for about 23½ miles to the south extreme of Nuhu Yut, but its outline is less regular than that to the northward. As far as Warka village are steep cliffs, 70 feet high in places; hence to southward of Watuar village the land slopes so that the summit of Mount Warhuk can be seen from close under the coast, after which it again becomes steep. Off Larat village are two small islets, and a little to the southward are the Aran islets on the shore reef.

There are numerous villages on the coast; Nirun, 9 miles southward of Nuhu Jaan, is the residence of the rajah of the district of that name. Hoiko village lies at the head of a bay of the same name, surrounded by steep cliffs; the village can only be approached by small praus; Duvin islet lies off the south entrance point of the bay.

Sungi and Ngavan, 2½ miles southward of Hoiko, and situated in a fine bay, are thriving villages, built on a narrow strip of beach, behind which the land rises so steeply that any enlargement of the village necessitates the houses being built on piles in the water. In the bay is a small islet used as a burial place.

Rerean island, 4¾ miles northward of Tanjong Weduar, is inhabited, and lies on the shore reef, which here is over half a mile wide.

Dangers.—Close under the coast, at about 6 miles southward of Nuhu Jaan and abreast and southward of Watuar village, are two detached reefs each about half a mile in extent, and another lies 1½ miles westward of Matahollat village.

Feer village, about 3 miles northward of Tanjong Weduar, lies at the foot of a high ridge, which decreases in height southward, and forms the south point of the island. The village is built on two terraces, which are reached by ladders.

Anchorage.—There is anchorage off Feer in about 20 fathoms half a mile from the shore, or in 13 fathoms closer in, but this depth is little more than half a cable outside the 3-fathoms line. The reef northward of Feer is marked by a beacon, and continues south-south-westward as a ridge with 10 to 14 fathoms on it, with deeper water between it and the shore.

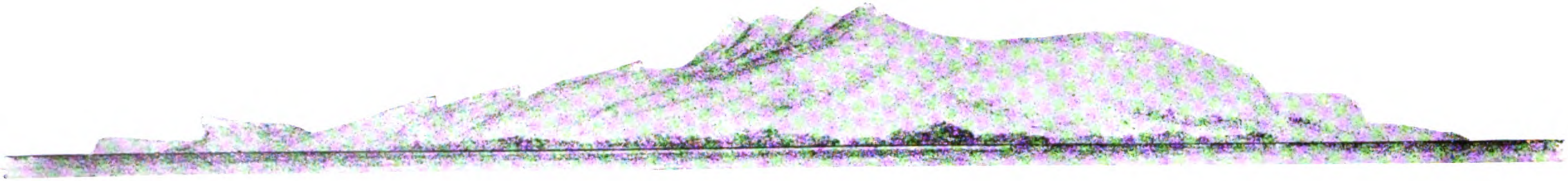
Southward of Feer, on flat ground planted with cocoanut trees, is Langiar village, with a large square mosque built in the middle of it.

Tanjong Weduar (*Lat. 6° 0′ N., Long. 132° 49′ E.*) is formed of vertical grey cliffs about 170 feet high. It is said to lie one mile farther south than is shown on the chart.

The strait between Nuhu Roa and Nuhu Yut is about 3½ miles wide in the narrowest part, between the reefs off Abean village on the

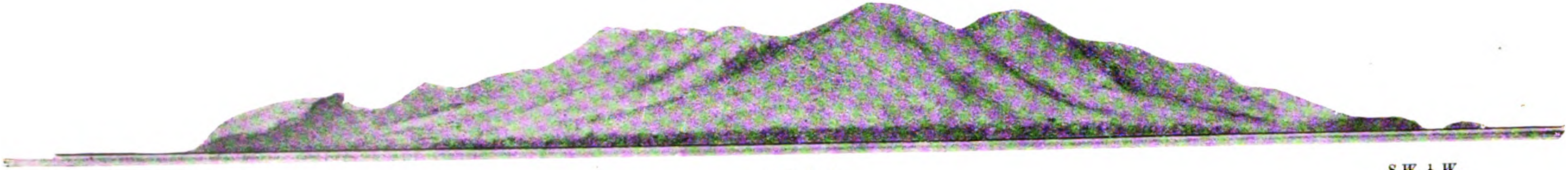
To face page 182.]

(a)


S.E. by E.
S.E. by S.

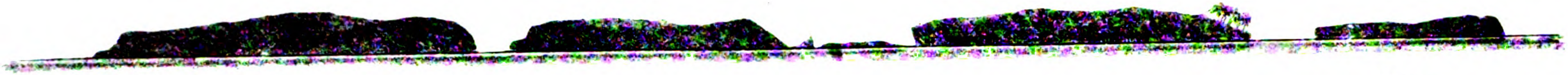
Kur island. S.E. 17 m.

(b)


S. by W. ½ W.
S.W. by S.
S.W. ¼ W.

Nuhu Yut or Great Kei. S.W. by S. 3 m.

(c)



Islands in the vicinity of Dobo. Aru islands.

west and Duvin islet on the east. It is deep and clear in the middle; along the shores of the islands are several reefs, already mentioned, which can always be made out in clear weather, and on which marks are placed by the natives.

Tidal streams.—The flood stream in this strait sets southward with a velocity of 2 knots an hour, which increases to 3½ knots in the narrowest part.

Chart 470, Aru islands. Var. 3° 20′ E.

The ARU ISLANDS, which lie about 65 miles east of Kei islands and 62 miles from the nearest coast of New Guinea, consist of five principal islands and numerous smaller ones, extending 107 miles north and south, and 51 miles east and west. The most important islands are Warialau, Kola, Wokam, Kobrur, Maikur-Koba, and Trangan, besides Penambulai, Barakan, and Barkai, which may be said to belong to the principal group, and are mainly of the same formation. The large islands are separated from each other by narrow channels or *sungi*, most of which are only navigable for craft of very light draught. The smaller islands of the group are isolated or lie in groups on reefs extending far seaward; some are joined to the main islands by reefs, but in many cases are separated from them by more or less useful channels. The groups of smaller islands from north to south are the Jedan, Watulei, Karaweira, Meriri, and Jin islands.

The islands are for the most part of coralline limestone formation, of little elevation, and clothed with virgin forest. Along the west coast northward of Black rock (Lelar) point very little stone formation is found, the coast consisting chiefly of sand; coral is only sporadic on this part of the coast; northward of Tanjong Samangas far as the north point of Kola island the stone formation is again in the foreground. The banks of the sungis are covered with bakau or mangroves.

Among the highest parts of the islands are the southern part of Trangan, which is hilly, and Great Karaweira (*Lat. 6° 58′ S., Long. 134° 51′ E.*), where the trees have a height of 241 feet above the sea.

From the south-west point of Trangan shoals extends out to a distance of 13 miles from the shore; outside these shoals the depth increases irregularly, and 20 fathoms will generally be found at a distance of about 20 miles from the shore.

Off the southern part of the west coast the 10-fathoms line lies about 9 miles from the land. The bottom is here very sloping, with numerous small elevations, and consists almost entirely of sand. Northwards, the 10-fathoms line gradually approaches the shore. At about

Chart 470, Aru islands. Var. 3° 20′ E.

10 miles west of Sungi Maikur the 100-fathoms contour is found, and runs regularly about parallel with the general trend of the coast, so that off Pulo Wasir it is only about 5 miles off-shore. In the deeper parts the bottom is chiefly mud; the water also is muddy, so that the shoals cannot be distinguished. On the west coast, with the exception of the Batavia reef and the Blackburne and neighbouring shoals hereafter described, there are no dangers for navigation at any distance from the shore, and except in the bay southward and eastward of Wamar, and also eastward of Ujir and Wasir islands, no detached drying reefs were found.

There is anchorage everywhere off the west coast, in the southern part, at a great distance from the shore.

The northern islands are bordered by reefs which extend from 1½ to 2½ miles off, outside these the depths are irregular.

The reefs off the eastern coast reach far out, and vessels should not approach these shores within 12 miles, at which distance depths of from 5 to 10 fathoms will be found, thence seaward the depths increase gradually. The reefs in general can be safely approached by the lead, and there is anchorage off them in a moderate depth of water. Between these reefs are passages through which small craft can obtain access to the villages and the large sungis which connect the east and west coasts of the islands. The principal of these sungis are Kola Watu, which separates Warilau from Kola; Kliplip Watu is a branch of Kola Watu trending north-eastward; Sisir Watu separates Kola from Wokam; Sungi Tungu divides Wokam into two parts; Sungi Wanumbai or Watulei lies between Wokam and Kobrur; Sungi Barkai or Koba separates Kobrur from Maikur and Koba; the eastern entrance of the last-named sungi is not visible from seaward, being hidden by islands, as is the case with the next mentioned; Sungi Maikur, between Maikur, Koba, and Trangan, and the river or sungi Serwatu, which divides Trangan into two nearly equal parts. These sungis are described farther on.

The water generally is not clear, so that the reefs cannot as a rule be made out by discoloration; dark brown patches seen first at a short distance should not be trusted; these patches are best seen when the sun is high.

The authority of the government of Netherlands India is exercised by a Controleur, whose head-quarters are at Dobo in Wamar island (*Lat. 5° 45′ S., Long. 134° 14′ E.*).

Inhabitants.—The Aru islands are thinly populated on the whole. In 1888 the estimated number of inhabitants was about 13,000, of whom about 600 were Christians and 400 Mohammedans, the remainder being heathen; the Christians and Mohammedans are found only on the west coast, and are originally from other islands. The stranger population consists principally of Chinese, Makassarese, and Buginese. The natives belong to the lank-haired race, some only of pure Papuan type. They are of gentle disposition, and generally understand the Malay language. Most of the villages on the east coast are built on rocks, and are reached only by a stair on the seaward side. On the west coast, most of the villages are small and hidden by trees, and can only be seen from a short distance. If much sickness or many deaths occur in a village the inhabitants desert it and settle elsewhere. Each village has its own chief; there are rajahs at Wamar, Krei, and Samang. The soil of the islands is fertile, but little cultivated. Sago palms, cocoanut, and aru trees are found in abundance; besides, the inhabitants cultivate for their own use, tobacco, sugar cane, maize, and other crops. There are wild pigs everywhere, and deer on Wasir, Ujir, and Wamar islands. The principal occupations of the people are diving for mother of pearl shell, shark fishing, and collecting trepang; the best birds of Paradise are obtained here, and are much in demand. The produce is purchased and exported by Chinese and Arab dealers. The pearl fishery is carried on by the Celebes Trading Company, an Australian company, which has a concession from the government for carrying on diving outside the 5-fathoms line; the part of the sea under 5 fathoms is reserved for the natives. The pearl fishing is carried on during the whole year, on the west coast during the east monsoon, and on the east coast during the west monsoon; the best time is during the months of February, March, April, September, and October.

The principal port in the island is Dobo (*Lat. 5° 45′ S., Long. 134° 14′ E.*), on the northern side of Wamar island, where all the trade is concentrated.

Western coasts of Aru islands.—Warialau, the northernmost island, is separated from Kola by the Kola Watu, and on the south-east side from a group of islands, of which the Jedan islands are a continuation, by a deep, but from information received, foul, channel. It is covered with high trees, which are somewhat higher on the north side than elsewhere, but there are no distinctly recognisable points. There are some sand beaches on the north, north-west, and south-west coasts. Warialau village lies on the south-west coast on the beach, and is visible from vessels taking the passage between Toba and Ngoba islands.

The reef of Warialau extends about 1½ miles northward and about 2½ miles north-eastward, where it forms a sandbank that uncovers at half-ebb. On the north-west, west, and south-west sides the reef consists of sand and stones or sand and coral.

General charts 942b, 2759a.

Chart 470, Aru islands. Var. 3° 20′ E.

Ngoba (*Lat. 5° 20′ S., Long. 134° 31′ E.*) is a low and densely-wooded island, situated on an enlargement of the drying reef off the north-west side of Warialau. Westward of Ngoba and separated from it by a narrow channel, lies an extensive sandbank dry at low water, a part of which is covered with grass and always above water.

Toba island, westward of Warialau, is also thickly wooded and somewhat higher than the islands near. It is separated from Warialau by a channel over half a mile wide, in passing through which the Toba shore should be kept close on board on account of the reef extending from Warialau and also a detached reef with 2½ fathoms on it.

A small shoal of 5 fathoms lies N.N.W. over 2 miles from the north point of Toba and W. by S. from that island at 2 and 4 miles distance are two reefs, each with 3½ fathoms, separated from each other and from Toba by deep water.

Kola island, southward of Warialau, is low and densely wooded. Kola village, built on a rock, lies on a creek on the north side of the island, and there is a pier here for small vessels to go alongside. From here Kliplip Watu is seen open.

Tiga islets are two or three high, thickly-wooded islets on the north-east side of the creek by Kola village, and make a good mark for the navigation of Kola Watu.

Kola Watu is a deep channel in which are no detached dangers. The reefs on either side are generally to be seen by the discoloured water; *see also* page 197. Kola island is bounded on the south by the Sisir Watu.

Buar island, separated from the north-west side of Kola by a shallow channel, is also low and wooded. A reef that dries extends 7 cables from the western side, and about 2¾ miles south-westward, with a 5½-fathoms channel between, lies a reef about half a mile in extent, with 2 fathoms least water; also near the south-west point is a reef with 2½ fathoms on it, situated between the 3 and the 5-fathoms lines.

Sisir Watu is the channel between Kola and Wokam islands; the western entrance is a narrow and tortuous channel in which the tidal streams are violent; it is said to be fit for small vessels. It forms a sort of delta at the mouth, with a number of islets and drying flats.

Pulo Wasir, the north-westernmost of the Aru islands, lies about 10 miles westward of the entrance to the Sisir Watu; it is rocky and higher in the north than in the south part. Along the western coast, which can be approached within a moderate distance, are four large wooded rocks; the northern rock can be recognised at a considerable distance. About 4 miles northward of Wasir is a patch of 9 fathoms least water, named Java reef. View *c*, at page 182.

Abnormal magnetic variation has been reported in this vicinity.

Wasir strait, between Wasir and Ujir islands, has two reefs in it, one over half a mile long north-north-east and south-south-west, with 3 fathoms, sand and stones, situated with the south point of Wasir bearing S. 64° W., 2¼ miles, and the other 6½ cables long north-west and south-east, with 2¾ fathoms, about three-quarters of a mile eastward of the former. The strait may be used except by vessels of much draught; no marks can be given for clearing the above dangers.

Pulo Ujir (*Lat. 5° 37′ S., Long. 134° 17′ E.*) lies south-south-east of Wasir, in a bight of the coast of the main island Wokam. The northern part is somewhat higher than the southern. South-south-west from Tanjong Tutupano, the western extreme of the island, on the drying reef, is a sandbank that does not cover at high water. View *c*, at page 182.

A reef is shown as extending northward from the north part of Ujir into Wasir strait, with the 2¾-fathoms patch above mentioned at its end.

Wokam island.—From the Sisir Watu, south-westward to Sungi Waliramai, the west coast of Wokam is bordered by a wide reef which dries off 7 cables. Sungi Waliramai is shallow and of little importance; off its entrance lies Lewakai island. Near Wakaltultulak village the Celebes Trading Company have two slips for their pearl-fishing craft. The coast then trends west-north-west to Tanjong Samang, which is sharp; from off this point rocky parts of the coast are here and there seen, mostly of a light grey colour.

The channel between Pulo Ujir and Wokam is dangerous. About one mile E. by N. from Tanjong Samang is a reef with 2½ fathoms least water, inside the 5-fathoms line, and farther northward abreast the middle of Pulo Ujir is a line of reefs mostly dry at low water, which nearly block the channel, leaving a passage half a mile wide and 6½ fathoms deep. One of these reefs, near the middle of the channel, has a sand patch on it which does not cover at high water. Should this channel be used, it should be taken at low water, as the muddy water prevents the reefs being seen when they are covered.

To enter from the westward, keep close under the coast of Ujir, and when the south point of that island bears North, steer for the dry sandbank; when nearing the latter steer to pass between it and the

Chart 470, Aru islands. Var. 3° 20′ E.

drying reef lying 1½ miles north-westward of it, after which the channel is wider.

The coast of Wokam between Tanjongs Samang and Malakafani is bordered by a reef which extends about 7 cables from the shore. Two villages, nearly hidden by trees, lie on this part of the coast. Tanjong Malakafani is the western extreme of Wokam island and the northern entrance point of Dobo harbour. View *c*, at page 182.

Plan of Dobo harbour on 1460.

Wamar island is roughly square-sided. Tanjong Ular, the north-west extreme of the island and the southern entrance point of Dobo harbour, is a low rocky point, off which are two rocks above water. The west coast of the island is low, with a sand beach and tolerably wide shore reef that dries. Off Tanjong Batu Duwa are two, and just northward of Wangil village three, rocks. View *c*, at page 182.

LIGHT.—Tanjong Ular (*Lat. 5° 45′ S., Long. 134° 11′ E.*).—A *white group occulting* light, showing three eclipses *every thirty seconds*, thus:—light, *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds*, is exhibited at an elevation of 72 feet above high water from a white iron framework, 42 feet high, situated on Tanjong Ular, the north-west extreme of Wamar island; it is visible 12 miles in clear weather. For arc of visibility, *see* Light list.

DOBO HARBOUR. — The channel to Dobo is formed by the narrow strait between the north coast of Wamar and the south coast of the western projecting part of Wokam. The greater part of the coast here is covered with mangroves. The channel is over 1¾ miles wide from coast to coast at the western entrance, whence it runs eastward, becoming gradually narrower until off Dobo it is only 5½ cables wide. On both sides the channel is narrowed by a broad drying shore reef that extends in some places nearly half a mile, while some projections of the 3-fathoms line reduce the navigable channel to a width of 2¼ cables. The sandy spit on which Dobo is built can be closely approached. Owing to the muddy state of the water no dependence can be placed on seeing the shoals, only the parts that dry being distinguishable at high water by the discoloration. Reefs, some of which dry, lie in the channel over one mile eastward of Dobo. *See* view on plan 1460.

Beacon.—A beacon surmounted by a white ball is situated on the edge of the reef on the south side of the harbour 4½ cables to the westward of Tanjong Dobo. It should be given a berth of half a cable.

General charts 470, 942b, 2759a.

Plan of Dobo harbour on 1460. Var. 3° 20′ E.

Anchorage.—The road of Dobo is bounded by lines drawn N.E. from Tanjong Ular and S.W. from Tanjong Merukujuring. The anchorage is safe under all circumstances. The ebb stream setting westward is often very strong.

A steel hulk, 200 feet long, with three masts, the store ship of the Celebes Trading Company, is moored in Dobo harbour. The hulk shows a bright *white* anchor light at night. Vessels are recommended to pass northward of the hulk.

There is good anchorage in 16 fathoms with the end of Tanjong Dobo bearing S.S.E., and the rock off Tanjong Ular W. ½ N.; but the trading steamers anchor during the south-east monsoon close to the reef eastward of the spit on which Dobo is built, for the convenience of unloading, and during the north-west monsoon they anchor to the westward of the spit. The native praus haul up on the east or west side of this spit, according to season.

Directions.—Approaching Dobo harbour from the westward, four openings in the land will be observed, the third of these, counting from the northward, being the entrance, which may also be recognised by the lighthouse on Tanjong Ular. View *c*, at page 182.

To enter, bring the flagstaff at Dobo in line with the white ball beacon S. 67° E., which mark leads over the end of the shoal extending from Tanjong Malakafani in 6½ fathoms least water at low tide. When the lighthouse on Tanjong Ular bears S. 37° W., alter course to S. 82° E., until Tanjong Fanajuring bears S. 68° E., midway between Dobo and Tanjong Merukujuring, which mark leads in more than 10 fathoms to the anchorage; vessels should pass northward of the hulk.

Attention should be paid to the tides at the entrance, the flood stream setting on to the Wamar reef and the ebb to the Wokam reef; within, the streams set in the direction of the channel.

Dobo (*Lat. 5° 45′ S., Long. 134° 14′ E.*).—The town of Dobo stands 2½ miles within the western entrance to the harbour, on a sandy spit projecting into the channel from the north-eastern part of Wamar island. It is the principal place in the Aru islands, where all the trade is concentrated, and is the head-quarters of a Controleur. The town occupies the whole of the spit, and consists of badly-built houses, some of which are built over the water on piles. The population consists of a medley of various nationalities, mostly, such as Japanese and Philippinos, employed in the pearl fishery, or Chinese, who are engaged in trade. A few Europeans are settled here, while the Australians employed in the pearl-fishing schooners have a large house which they occupy in turn. The native village, inhabited mainly by Buginese and Makassarese, lies outside the town proper,

Plan of Dobo harbour on 1460. Var. 3° 20′ E.

on the beach to the westward. Aru islanders do not live at Dobo, and only visit it temporarily to bring produce.

Supplies.—Pigs and fruit are obtainable in small quantities, but no other supplies; no drinking water can be procured; what water there is is bad and causes dysentery.

There is no coal obtainable; a small quantity (maximum 30 tons) is kept for the use of the police communication vessel. The coin used is the Dutch dollar at 4s. 2d., and the guilder at 1s. 8d.

Trade (*Lat. 5° 45′ S., Long. 134° 14′ E.*).—The chief article of export is mother-of-pearl shell; the value of which in 1908 amounted to £97,900; other articles are trepang and bird of Paradise skins. The imports are few, and comprise canvas and copper nails and sheets.

Communication.—The vessels of the Royal Netherlands Steam Packet Company call at Dobo once every other month on the voyage from Amboina to Merauke and twice on the return voyage. On the alternate months they call twice on the outward and once on the return voyage. The vessel on the Java-Australia line calls occasionally; *see* page 17.

Tides.—From observations obtained at Dobo (in September) it would appear to be high water, full and change, at about 2h. 30m. Springs rise 6 feet, but the time of high water is uncertain. It is said that high water occurs off Warialau at about the same time as at Dobo, and off Tanjong Ngabordamlu at 2 hours after high water at Dobo.

The following remarks are taken from the Dutch Sailing Directions:—

The vertical movement of the water at Dobo is mixed, with a predominating double-daily character, and is almost purely double-daily when, in the second half of March and September, 0° moon's declination occurs three days after full and change.

The double-daily tide has springs 3½ days after full and change, with high water at 4h. and an average range of 5 feet; neap tides at the same interval after the quarters, with a mean range of 3 feet.

The single-daily tide has high water on 1st January about 9h. p.m.; 1st April, about 3h. p.m.; 1st July, about 9h. a.m.; and 1st October, at about 3h. a.m. Springs occur half a day after the greatest moon's declination with a mean range of about 3½ feet; neaps, half a day after 0° moon's declination, with a mean range of about one foot.

The high and low waters of the spring tides of the two descriptions cannot fall together.

General charts 470, 942b, 2759a.

Plan of Dobo harbour on 1460. Var. 3° 20′ E.

The highest spring tides occur about the second half of March at 4h. p.m., and about the second half of September at 4h. a.m.; the lowest about the second half of June at 10h. p.m., and the second half of December at 10h. a.m.

The tidal movement is weakest when 0° moon's declination falls 3 days after the quarters.

Tidal streams.—The flood stream at Dobo harbour comes in from the westward, and the ebb stream from the eastward. In the south-east monsoon the flood is weak, but the ebb runs at the rate of from one to 1½ knots an hour and lasts longer than the flood.

In the offing the flood stream sets to the southward and the ebb to the northward.

Chart 470, Aru islands.

Bay between Wamar and Maikur.—Between Wamar island and Tanjong Fatujuring (*Lat. 5° 58′ S., Long. 134° 10′ E.*) in Maikur, the coast forms a deep bay, in the northern part of which Sungi Tungu and in the southern part Sungis Wanumbai and Barkai, have entrances. The eastern shore of the bay northward of Sungi Wanumbai is irregular in outline, with numerous points and bights; between Sungis Wanumbai and Barkai the coast (part of Kobrur island) is mostly rocky, with five small islets or large rocks close off it and near the mouths of the sungis.

The south shore of the bay is higher, with rocky points here and there, and between Tanjongs Fatujuring and Meijuring is a bayof little importance, and partly closed by a reef with 7 feet least water on it.

Dangers.—The south coast of Wamar is foul to a distance of over one mile from the shore. Eastward of Wamar, between that island and Wokam, are several reefs which render the navigation of this part dangerous without local knowledge and the help of sea marks. Meirang and Lomar islands lie off the Wokam coast eastward of the south side of Wamar; Meirang has a small islet near it. The south-west point of Wamar bearing N. 52° W., leads southward of the above dangers.

Off Tanjong Taordefete lie two reefs with depths of 8 and 7 feet least water, separated from each other and from the shore by channels in which the depth is over 5 fathoms. The south-east point of Wamar bearing N. 2° E. leads westward of these reefs, which extend over 2 miles west-south-westward from Tanjong Taordefete.

A detached reef with 2 fathoms least water lies 1½ miles north-westward of Tanjong Fatujuring, and about one mile east-south-eastward from Tanjong Meijuring is a reef that dries, which however is out of the channel leading to Sungi Barkai.

A bank of peculiar shape lies just off the entrance to Sungi Wanumbai; it has a least depth of 2½ fathoms, and makes the approach to the sungi difficult for vessels of much draught.

Babi island (*Lat. 5° 54′ S., Long. 134° 10′ E.*), about midway between the south-west point of Wamar and Tanjong Fatujüring, is low and wooded; on the south-west side three rocks lie on the shore reef that dries at low water. Babi may be approached on the north-west and south sides to a distance of one mile, but the shore reef extends about 2 miles to the eastward of the island.

Directions.—Vessels proceeding to Sungi Barkai can pass either northward or southward of Babi island. If passing northward, steer eastward midway between Wamar and Babi until a clearly recognisable point southward of Tanjong Meijuring bears S. 10° E., when steer for it on that bearing until the middle of Babi island bears N. 46° W. and Benjina village S. 46° E., when steer for the latter on that bearing; after passing the reef that dries, situated eastward of Tanjong Meijuring, the entrance of Sungi Barkai may be steered for in a depth of water always over 5 fathoms.

If passing southward of Babi, steer S. 76° E. between the reef extending from that island and the 2-fathoms reef off Tanjong Fatujuring, until the remarkable point southward of Tanjong Meijuring bears S. 10° E., when steer S. 46° E., with the middle of Babi astern, bearing N. 46° W., as before directed.

West coast of Maikur.—Maikur-Koba island, lying between Sungis Barkai and Maikur, is flat and thickly wooded, and extends about 43 miles in a north-west and south-east direction, with a greatest width of 11 or 12 miles. The west coast between Tanjong Fatujuring and Sungi Maikur is low, densely-wooded land, with a narrow sand beach. On this coast the Beleloide river discharges; it is dry at low water and of no importance; off this river shoal water to the depth of 3 fathoms extends 2 miles from the shore.

Shoals.—It is reported that at about 3½ miles south-west of Tanjong Ratu is a shoal with 5 fathoms least water.

Also, just northward of Maikur village, that there are three shoals with 4 fathoms on them at low water, the outermost of which lies about 2½ miles from the shore, and just inside the 10-fathoms line.

Sungi Maikur has a wide and navigable entrance between Maikur and Tabarfane islands. On the north side of the entrance is the unimportant Christian village of Maikur, and farther up, on the south bank, Tabarfane village, in the neighbourhood of which the Celebes Trading Company have a slip for their pearling craft, and a small repairing yard. Wangal, a small village on the north shore, is situated in a very shoal bay.

Off Tabarfane village, just northward of mid-channel, is a steep-to rock which dries at low-water springs, otherwise the channel is clear for more than 5 miles from the entrance. The sungi is said to be sufficiently deep everywhere, but to be only a few yards wide in some places, and therefore not navigable by large vessels. The approach from the westward presents no difficulty with the lead going. The *Flying Fish* anchored off Maikur village in 5½ fathoms, with the extremes of Maikur bearing N. ½ E. and E. ½ S.

TRANGAN is the southernmost of the large islands composing the main body of the Aru group. Its northern part is flat and wooded.

West coast.—Between Sungi Maikur and Sungi Serwatu, three small rivers discharge, namely, the Hokmar, Lutur, and Rebi, navigable by native craft. In front of Hokmar river, shoal water to the depth of 3 fathoms extends 3 miles from the shore. Just northward of the Rebi river are two small islets which, from the southward, are seen clear of the land, but from the northward are difficult to make out.

Dangers.—Batavia reef (*Lat. 6° 20′ S., Long. 134° 3′ E.*), lying about 10 miles south-south-west from the entrance to Sungi Maikur and 3½ miles off-shore, consists mainly of two shoals, the northern of which has a depth of 2½ fathoms and the southern 3 fathoms, sand. They are divided by a channel 2 cables wide and 10 fathoms deep. There is also a third shoal of 3½ fathoms. These shoals cannot be distinguished by the colour of the water. The north-west point of Trangan bearing N. 31° W. leads north-westward of the reefs.

Besides Batavia reef some small shoals of 5 fathoms were found, the outermost lying West from Lutur river at about 9 miles from the shore.

The bottom in this locality is very uneven, but steep, so that the lead gives good notice of approach to the shoals.

Sungi Serwatu, which divides Trangan island into two parts, discharges by Tanjong Deréhi. The western entrance is one mile wide, and in front of it is a large bank, on which the depths range from one foot to 3 fathoms; a channel 2 cables wide with a least depth of 2¾ fathoms at low water, leads through this bank. The channel is said to shift with the monsoons. Within the bar the channel becomes wider and deeper, and the western bank should be approached to avoid a drying reef north-eastward of Tanjong Deréhi.

In the western part of the river the channel is clear, except for two small patches of 4 fathoms. The banks, which consist alternately of limestone rocks and low land with mangroves, are quite uninhabited. The inner part of the river above Sungi Lolur appeared to be only navigable by praus. Sungi Serwatu affords excellent shelter for small craft.

From Sungi Serwatu to Naiguli village the coast is low.

Naiguli, where the *Flying Fish* commenced her survey, is a fishing village on the west coast, in lat. 6° 37′ S., about a mile to the northward of some large white boulders. It is situated at a little distance from the coast, on a plateau above the surrounding land, and is plainly visible from seaward. At 2¼ miles south-east of the village is North hill, a flat-topped wooded hill, 282 feet high, the best mark for this part of the coast. There is good anchorage during the south-east monsoon in smooth water one mile off Naiguli, in a depth of 6 or 7 fathoms, sand. The flood-stream in the offing here runs to the southward, and the ebb to N.N.W., the streams turning 1½ hours after high and low water by the shore.

From Naiguli the coast trends nearly S. by W. for 9 miles, and is low, rising gently to hills, thinly wooded or covered with reeds as far as Tãnjong Lelar with a large black rock on it, but between Naiguli and Ngaibor are a few rocky points.

Ngaibor village lying southward of Naiguli, is the largest on the west coast of Trangan, and is Christian. Close northward of it Sungi Ngaibor discharges; it is 60 yards wide at the entrance, and is probably the largest fresh water river in the Aru islands; it overflows its banks in the rainy season, and is fresh close to the mouth. Sungi Grun, 50 yards wide at the entrance, flows into the sea northward of Tanjong Lelar. From Lelar the coast trends south-south-east 3½ miles to Tanjong Bain, and has a rocky appearance.

Shoals.—Westward of the mouth of Sungi Serwatu, four patches of 5 fathoms were found, extending to a distance of 6½ miles from the shore.

A shoal with 3½ fathoms least water, lies N. 52° W. $3\frac{7}{10}$ miles from Feruni village.

Between Naiguli and Tanjong Lelar are some shoals of 4½ and 5 fathoms least water.

Tanjong Bain (*Lat. 6° 49′ S., Long. 134° 5′ E.*), the south-west point of Trangan, is a bluff point 213 feet high, with a very remarkable white square patch on it. At 1½ miles N.N.E. of the white patch is Bain village, on a hill 226 feet high; and a range of low hills extends for 3 miles further in the same direction. Bain hill, 300 feet high and wooded, rises 3½ miles east of the white patch. This hill is the highest in Trangan and is very conspicuous from the southward, but not so from any other direction. From the south-west point the rocky coast trends east for 3½ miles as far as the mouth of Sungi Tafermaar, and then, turning south-east, forms a bend which is 6 miles across.

There are three small rivers on this part of the coast, of which Sungi Tafermaar is the principal. The water is salt a good way up; the banks are vertical in places, and from 50 to 65 feet high, formed of red sandy soil.

North-westward of Tanjong Bain, at about 7 cables from the shore, there is a shoal with 2 feet least water just within the 3-fathoms line, which must be avoided by vessels navigating near the shore.

South point or **Tanjong Ngabordamlu** (*Lat. 6° 56′ S., Long. 134° 12′ E.*), the south point of Trangan, consists of low sandstone cliffs 20 to 30 feet high. Off the point is a small islet about 120 feet high. The point is in bad repute with the natives on account of the strong and confused streams, often accompanied by a heavy sea in the neighbourhood.

Batu Goyang or White rock is 37 feet high and bare; it is connected with Tanjong Ngabordamlu by a reef.

Reefs.—At 4 cables eastward of Batu Goyang is a rock awash at high water, situated on a detached reef a quarter of a mile in length east and west; between Batu Goyang and this reef is a narrow channel with a depth of 4½ fathoms at low water. The reef is always marked by breakers.

A reef with 1½ fathoms least water lies S. 23° E. fully 1¼ miles from Tanjong Ngabordamlu; it is half a mile long east and west and 3 cables wide.

A shoal one mile long east and west, with 1¾ fathoms on it, lies 3 miles east-south-eastward from Tanjong Ngabordamlu.

Tide.—It is high water at Tanjong Ngabordamlu (South point) at 3h. 45m.; springs rise 6 feet. *See also* Tides at Dobo, page 190.

Blackburne shoals, off the south-west point of Trangan, consist of several detached shoals of 8 feet to 3 fathoms, occasionally breaking on the shallowest parts, and having deep water between them. They extend 5 miles west-north-west and east-south-east, with other shoals between them and the south point of Trangan, and several patches of 5 fathoms are found at from 4½ to 8 miles southward of the shoalest part. These shoals are too numerous to be described in

Chart 470, Aru islands. Var. 3° 20′ E.

detail; their position and form can best be seen by reference to the chart, and as the land is frequently obscured, and even when not hidden has few well-defined points, no marks can be given to clear them; they should therefore be given a wide berth. The tides are very strong here, and when running against the wind raise a considerable sea; it is not unlikely, therefore, that the shoals shift from time to time.

Though irregular, the soundings deepen towards the southward and westward, and as a rule the 20-fathoms line will be found at a distance of 20 miles from the south-west point of Trangan.

Chart 942b, Eastern archipelago, eastern portion.

Shoal reported.—The U.S.S. *Relief* in 1908 obtained a sounding of 13 fathoms in a position about S. 40° W. 37 miles from Tanjong Ngabordamlu, the south point of Trangan.

Chart 470, Aru islands.

Eastern coasts of the **Aru islands.—Jedan islands,** four in number, lie on an extensive reef, consisting of sand, stones, and coral, lying eastward of Warialau, and separated from it and the islands south-east of it by a wide and deep channel. The reef is intersected by several channels through which the tidal streams run strongly when the reefs begin to uncover. On the northern part of the reef extending 4½ miles northward of Belading is a narrow sandbank which uncovers at half-ebb. A detached reef, dry at low water, lies one mile eastward of Jedan, and extends 2 miles in that direction; on its eastern end is a similar sandbank to that just mentioned; and southward of Jedan lies the atoll-shaped sandbank Surat. On some spots north of Lutur and Belading the reef is covered with low shrubs. The edges are mostly steep-to, and where such is not the case as in part of the north-east side, the bottom outside the depth of 7 fathoms is irregular, and at 3¼ miles northward of Jedan island is a 5-fathoms patch marked by tide rips. Rich pearl banks are found near this group. The Jedan islands are uninhabited.

Jedan island (*Lat. 5° 23′ S., Long. 134° 42′ E.*), the eastern of the group, half a mile long east and west, is sandy, wooded, and 167 feet high to the tops of the trees. It appears to be the highest of the group, is visible 13 miles, and can be made out better than the others at night. On the south-west side are some fishermen's huts, and near them a well with tolerable drinking water. On the north side the reef extends 2 miles. Small vessels can approach the south-east side of the island to a distance of 1¼ miles in depths of 5 to 3½ fathoms. A narrow, winding, but deep channel separates Jedan from the reef to the eastward, from Surat, 1¾ miles to the southward, and from Santigi and Lutur situated on the same reef, to the westward. Santigi consists of five low islets covered with mangrove bushes. Lutur has a tree on its north side higher than the rest, which may be used as a bearing point. Belading, the western of the group, is 1¾ miles long north-west and south-east.

The archipelago south-east of Warialau consists of eight islands, the southernmost of which is Tapusur. The eastern approach to Kola Watu lies northward and southward of this island, that to the northward being the best. The sides of the channel are generally to be seen from the discoloured water; the depths are from 5 to 12 fathoms, but there is a patch of 2 fathoms southward of the east point of Belading. The entrance may be reached by steering in with the south point of Lutur island in line with the middle of Surat N. 82° W., but there is a small dry patch southward of this line about 1¾ miles east-south-eastward of Surat. The channel passes round a sandbank, dry at half ebb, lying on the end of the reef extending northward from Tapusur and then eastward of Lafusa island. The channel southward of Tapusur is only fit for small craft.

East coast of Kola.—Kola island (*see also* page 186) is intersected by several channels, of which the principal are the Marjina and Marlassi rivers. A great part of the east coast is rocky but densely wooded. Marlassi village lies half a mile southward of the river of that name, and Masidan village is built on a rock near Tanjong Leitin, the eastern extreme of the island. About 1½ miles southward of Tanjong Leitin are two conspicuous trees (1894), visible 14 miles off. Shoals, dry at low water, extend 5¾ miles eastward from the north-east point of Kola; some islands lie on the reef near the shore off Kulur. On the reef extending from the shore between Marlassi river and Sisir Watu, there are in many places several low trees and also wooded islands, the largest of which is Binaar.

Konan, lying about 5½ miles east-south-eastward from Tanjong Leitin, is a sandy, thickly-wooded islet, atoll-shaped, and uninhabited, and surrounded by an extensive reef extending 3 miles northward and one mile eastward from it; between this reef and the reef of Kola island there is a channel. At 1½ cables from the north-east point and close to the south-east side are two rocks covered with vegetation. In clear weather Konan is visible 13 miles, and from north or south it then appears as two trees showing above the horizon.

Arar Kula (*Lat. 5° 35′ S., Long. 134° 47′ E.*), lying 1¾ miles southward of Konan, is a coral and mud bank partly above high water, with some low trees on it. The bank is separated from the reef of Konan by a narrow winding channel, and from the Wokam island shore by a fairly wide channel with depths of from 3½ to

4½ fathoms, but the southern entrance is foul. Eastward of Arar Kula the reef extends 2 miles, while 3½ miles E. by S. from the island is a detached drying reef near the 5-fathoms line. The channels north and south of Arar Kula are considered as the entrances to Sisir Watu, which is a means of communication, for small craft, between the west and east coasts.

The east coast of Wokam is, like that of Kola, densely wooded and rocky as far as Tanjong Komfane; on this part of the coast are several villages, Moha and Nanjujukin being the principal. They are built on rocks, and appear as light red patches. Kutbaai islet, lying off these villages, forms a suitable mark for bearings when seen from the south-east and appearing in the entrance to Sisir Watu. Ikaguri island, southward of Kutbaai, is difficult to distinguish from the land behind it.

The point one mile south of Tanjong Komfane is projecting, and can be seen from a great distance from north or south, appearing then as several separate islands owing to the gaps in the trees. On it is a group of high trees, the highest of which, with a hammer-shaped top, is conspicuous from east or south-east, and can be seen 15 miles off. Southward of this point is a wooded islet and two islands named Wodinhun and Wahalaulau. Here the coast turns westward and southward, and offers no more recognisable points.

Reefs.—From Tanjong Komfane (*Lat. 5° 39′S., Long. 134° 45′E.*) the shore reef extends 4 miles eastward, and 6 miles east of Wodinhun is a drying patch of sand, coral, and shells, with deep water around.

Coast.—The remainder of the east coast of Wokam is divided by numerous rivers into several islands, of which the principal are Aranlau and Sewer, and is for a great part obscured from seaward by the off-lying Watulei and Jursian islands. Westward of Tabar island the coast forms a bay 2½ miles wide and 3 miles deep, in which are several islets; some rivers discharge into the bay. The entrance to the Jarang jin, which forms the west boundary of Aranlau island, may be known by a light-coloured islet in front of it. On Sewer island lies the village of that name; the south-eastern point of Sewer is named Tanjong Lingajuring.

The Watulei group consists of a large number of rocky islands, the principal of which are Aduar, Kumul, Watulei, and Tabar, lying off the east coast of Wokam island, and surrounded by reefs, through which narrow channels give access to the villages. Jursian and the islands near it may be considered as belonging to the Watulei group. Aduar, Kumul, Watulei, and Jursian are inhabited.

Rewang, the northern of the group, comprises three small wooded islets close together, of which the south-western is the highest. Rewang is difficult to make out until it is open of Aduar and Manien. The reef here extends about 1½ miles eastward, and farther out are detached patches of 2¾ fathoms at 2 miles, and 5 fathoms at 3 miles from the east side of Aduar.

Manien islet is thickly wooded and visible 17 miles; its west side is rocky and higher than the east, which is a sand beach.

Aduar island (*Lat. 5° 45′ S., Long. 134° 48′ E.*), the largest and highest of the Watulei group, is covered with high trees. There are several rather large villages, two of which on the east side of the island are shown with flagstaffs. Ilmamui island, southward of the south point of Aduar, is lower and thickly wooded. Ngoab islet is rocky and covered with low wood; it is conspicuous from two isolated cocoanut palms.

Kumul island is thickly wooded and has a village on the east side (where a flagstaff is shown), which may be reached by a passage through the reef. The south-east part of the island ends in a narrow rocky tongue of land, formerly the site of the village, but now bare and appearing as a remarkable light patch, with a clump of cocoanut trees on the north side. South-westward of Kumul are Mangan island and some islets.

Watulei island, about one mile in extent, has a bare patch on its north point similar to that on Kumul. The village is on the east side of the island, and has a flagstaff as charted; north-westward of it is a conspicuous clump of high trees, the tops being about 150 feet above the sea, which forms a mark for the navigation of the channel through the reef leading to Kumul and Watulei villages. Only the north point of the island can be approached by small vessels at low water. The chart shows two beacons on the edge of the reef at 1¾ miles north-eastward of Watulei.

Tabar island, thickly wooded and flat, lies westward of Watulei and separated from it by a narrow channel. Elel, Menlau, and Mentai are rocky islets covered with vegetation, lying in a south-east direction from Watulei on an extensive reef. On the north-east point of Menlau is a group of cocoanut trees with a village. Mentai lies nearly 1¼ miles within the edge of the reef, and the trees on it have the appearance of a plume. Ramje, Waria, and some other rocky and wooded islets partly close the entrance to the bay westward of Tabar. On the north-east point of Waria is an extensive village, visible from the sea and reached by a winding channel in the reef, passing southward of Mentai. Karaum village on the coast of Wokam lies southward of Waria.

Jursian comprises several rocky, wooded islands, in which are numerous creeks; the southern part lies close to the coast of Wokam. The north point of the island can alone be made out from seaward by Jursian village near it, built on a rock. Various other small islands lie off the north part of Jursian. Kumir islet lies eastward, Ngawab island northward, and Matutui westward; Maria island lies south-westward of Jursian, besides others, for which *see* the chart.

Channel to Kumul and Watulei.—At about 2¾ miles north-eastward of Watulei is the entrance to a narrow but fairly deep channel, which leads south-westward and westward towards Kumul and Watulei villages. The outer edge of the reef can be approached safely by the lead, and the best anchorage off the mouth of the channel is in about 3¾ fathoms with the north point of Kumul in line with Ngoab, and Mentai bearing S. 1° E. The eastern part of the channel can be navigated by making use of the danger angle, 32½° to 33½°, between the middle of Mentai and the high trees of Watulei, until the west point of Great Karaweira and the east point of Menlau are in line. Varying depths are then found, but not less than 14 feet at low water. By keeping on the northern side of the channel in the eastern part, until the eastern point of Great Karaweira is in line with Mentai, and then on the southern side, depths of not less than 17 feet will be found. The channel is only three-quarters of a cable wide in some places. The ebb stream runs outward with great strength at springs.

Karaweira islands.—This group consists of 13 islands, which may be divided into two parts, the Karaweira Watulei and Karaweira Meriri. To the former belong Great Karaweira and Sabir, both on a reef that dries; the Karaweira Meriri lie 2 miles southward. The southernmost is called Dorlau, but the others have no names.

Great Karaweira (*Lat. 5° 57′ S., Long. 134° 51′ E.*) is the highest land on the eastern coasts of the Aru islands, and is visible 20 miles off. It is rocky, thickly wooded, and has several large rocks close to the shore. It is uninhabited, as are also the other islands of the group; they appear to be very unhealthy. The highest tree in the middle of the island is 241 feet above the sea, and when seen from east to north-east is very conspicuous, having a top like a cross. Sabir islet, three-quarters of a mile eastward of Great Karaweira and near the edge of the reef, is small and lower, and appears as two islets sometimes, being nearly divided in two by a depression. Near the south-east point is a rock above water. The reef on which both islands are situated, and which extends to Maar islet on the west, extends 4 miles north of Great Karaweira, and has on it some sandbanks which dry at half ebb.

The islands of the Karaweira group extend north and south over a distance of 4¾ miles; Dorlau, the southern, is covered with vegetation, and has two high trees on it. Eastward of the reef of Karaweira Meriri is a black coral patch dry at low water, at 2½ miles from the group; the reef extends southward 2 miles from Dorlau, and in 1894 had four low solitary trees on it.

Maar islets, two in number, are small and rocky, the western being the higher. They lie 3¼ miles westward of Great Karaweira. The eastern islet appears from the north-east as two, but the parts are connected by a natural bridge.

Reef.—Eastward of the reef of Great Karaweira and separated from it by a channel with depths of from 2¾ to 5 fathoms, is a reef 8 miles long north and south, 2½ miles wide at the south end abreast Great Karaweira, and tapering to a point at the north end, with depths of 1¾ to 2¾ fathoms; off the south-east part is a small detached patch of 1¼ fathoms. The outer edge of the reef lies 4¾ miles north-eastward and 4 miles eastward from Great Karaweira, and its northern extreme is 4 miles eastward of Watulei island; it may be approached by the lead.

North approach to Sungi Wanumbai.—The usual channel for praus from Watulei to Sungi Wanumbai lies in a southerly direction for 3½ miles between the sandy northern part of the reef just described and the reefs extending north-eastward from Jursian island; it then bends west-south-westward and again southward, passing about a mile eastward of Jursian island, between the two Maar islets and between the Karaweira reefs on the east and the reef extending from Wokam on the west. The least depth in the channel is 2 feet at low water about 2 miles southward of Maar islets. Vessels wishing to approach the village of Jursian can find suitable anchorage in the northern part of the channel in 5 fathoms, mud and coral, about 3½ miles from the village. The tidal streams follow the direction of the channel; at springs the ebb is said to have a velocity of from 2½ to 3 knots.

Batu Kapal (*Lat. 6° 4′ S., Long. 134° 51′ E.*), situated about 2½ miles south-south-west from Dorlau and 4 miles from the coast of Kobrur, is a high rock partly covered with vegetation, and when open of the Kobrur coast forms a good mark. The channel northward and eastward of it is foul, and at 7 cables south-westward is a patch of 3 fathoms shown as a dry bank on the chart. At 3 miles S. 25° E.

Chart 470, Aru islands. Var. 3° 20′ E.

from Dorlau is a small sandbank above high water, surrounded by a reef about 2 miles long east and west and one mile broad.

South approach to Sungi Wanumbai.—Northward and southward of the reef just mentioned are passages which unite and lead north-westward to the entrance of Sungi Wanumbai, passing southward of Batu Kapal (*Lat. 6° 4′ S., Long. 134° 51′ E.*).

In the northern channel the general direction of which is S.W. ¾ W., the depths are from 5½ to 9 fathoms as charted, but are stated to be from 7 to 11 fathoms. Besides Batu Kapal and the Karaweira islands, a bare white trunk of a tree on Leliling island serves as a good mark for the navigation of the channel, off the entrance to which the flood stream sets southward and then south-westward, and the ebb to the east-north-east. With Dorlau bearing beween N. 71° W. and N. 25° W., the steep south side of the channel is determined by means of the danger angle of 86° between Batu Kapal and the highest point of Sabir, eastward of Great Karaweira; the angle increased to 91° leads well northward of the south side.

In the southern channel, to the northward of the reef of Meriri island, are several patches of 2½ and 3 fathoms. A danger angle of from 29½° to 31½° between Batu Kapal and Dorlau will serve to avoid these, in a depth of probably not less than 3¼ fathoms. The use of the angle is discontinued when the white tree on Leliling bears S. 53° W. In the basin southward of Batu Kapal there is good anchorage, mud and sand bottom. Westward of Batu Kapal, the channel is not yet sufficiently surveyed.

Sungi Wanumbai, about 28 miles in length, divides Wokam from Kobrur, and is the principal means of communication between the east and west coasts of the Aru islands. Its breadth varies from less than 90 yards to over 2 cables, with depths of more than 10 fathoms, except at the eastern end, where the width gradually increases to 2 miles, with a much less depth of water. Vessels of more than 9 feet draught can only enter the sungi at the western end. The banks in the western part, as far as the cascade of Malalaukuri, are rocky; then follows a part where the land is low and swampy and the water muddy, while at the eastern entrance the banks are alternately stony and sandy; both banks are thickly wooded. The narrowest parts of the strait are found between Silbatabata and Malalaukuri villages. Small cascades of fresh water are at Wairlilifulang, Lumlum, and Malalaukuri, on the south side of the sungi; about half a cable northward of the cascade of Lumlum, which is not visible from the sungi, a remarkable single tree is seen on the northern bank on the summit of a hill.

General charts 942b, 2759a.

Chart 470, Aru islands. Var. 3° 20′ E.

At the western entrance a reef projects from the south-west point of Wokam (*see also* p. 192), and on the southern side of the channel is a rock covered with vegetation, which shows light green, and which must be passed close to. At 2 miles within the western entrance is Wanumbai village on Kobrur island, where good drinking water may be obtained.

In navigating the sungi it is necessary to keep in mid-channel, except in that part extending from one to 3½ miles eastward of Kudari Muri river, where the south bank should be kept owing to extensive mudbanks on the north side. Small vessels bound to Watulei use the channel northward between the Maar islets and eastward of Jursian, mentioned on page 201, and those for Meriri islands use that southward of Batu Kapal. The eastern entrance has not been closely examined, and it is possible that deeper channels exist.

Tidal streams.—In the western part of the Sungi Wanumbai the flood stream runs eastward and the ebb westward with a velocity of from 1½ to 2½ knots an hour; in the eastern entrance the flood runs westward and the ebb eastward to the sea.

Meriri islands.—This group consists of Meriri and Leer, and several smaller islands of which Lola is the most important and the most southerly; they lie in a north-north-east and south-south-west direction, and are in great part overgrown with cocoanut trees, two of those on the north side of Meriri, the northern island, being 167 feet high, and can be seen 15 miles off. Near the north point of Meriri are two rocks, and the same number lie off the south-east point; on one of the latter the village is built, visible seaward. The islands are noticeable by having several dark boulders on the sandy shore. From Meriri the reef extends 1½ miles northward and north-westward, with three high sandbanks on it. On the east side the edge of the reef is comparatively close to the shore, and the soundings decrease gradually on approaching from seaward, with the exception of a little irregularity at about the 5-fathoms line, where a ridge with about 4 fathoms rises, with deeper water again inside. With the village of Meriri bearing S. 81° W. and distant 7 cables from the shore the depth is not less than 4 fathoms. On the reef north-eastward of Leer island lie Wadijili and Seja islets, the former of which is in two parts, with a detached rock southward of them. This reef is separated from the reef of Meriri by a channel in which the depth is 3½ fathoms.

Leer (*Lat. 6° 12′ S., Long. 134° 52′ E.*) has much dead wood on it; from the south-eastward, it and the highest point of Meriri come in sight at the same time. Five small rocky islands lie on the reef off the south point of Leer; on the westernmost stands a single cocoanut tree; on Lola, the southernmost, is the village of the same name, and just southward of the village, on the point of the island, is a clump of cocoanut trees. Lola is surrounded on the east and south by a reef with 2½ fathoms least water. Small vessels can approach the village to within about one cable.

The Meriri islands lie about 5 miles off the eastern coast of Kobrur, and the intervening space is almost entirely occupied by sandbanks and reefs. On the shoals between the Karaweira and Meriri islands are often heavy tide-rips.

East coast of Kobrur.—From Tanjong Balatanjuring (*Lat. 6° 5′ S., Long. 134° 46′ E.*), the north-east point of Kobrur, the coast trends north-west, forming the south bank of the Sungi Wanumbai. From the same point it stretches southward and south-westward for about 20 miles to the south-east point of the island. Laklakar island lies near Tanjong Balatanjuring, and is rocky, wooded, and surrounded by seven detached rocks covered with vegetation. About 3 miles southward of Laklakar is the mouth of Sungi Warloi, which leads to Kojabe village; in the river entrance lies Leliling island with Warloi village on its east side. Northward of the village is a remarkable white dead tree, previously mentioned. On the coast of Kobrur are several villages; Kobrur lies at the entrance of a river of the same name, and Pono is situated on the rocky south point at the entrance of Sungi Barkai. The coast reef extends in some places 2 miles out, but has not been fully examined; on it are Waria, Kokwana, and Kuling islets, besides two rocks.

Penambulai and Jambuai are the names of the northern and southern parts of an island, 12 miles long north and south, and 4 miles wide, lying southward of the Meriri islands, and separated from them by a channel about 3 miles wide. It is thickly wooded and sandy, except near the rocky south-east point. On the north coast is the entrance to Kangurma river, with a village on the east, and a rocky patch on the west, side.

Uafu Fenjuring (*Lat. 6° 19′ S., Long. 134° 54′ E.*), the east point and the eastern extreme of the Aru islands, is well marked by its high trees and sandy shore. Near Rabal at about the middle of the east coast the tree-tops are elevated 166 feet above the sea. At about one mile south of Rabal there are many dead trees, and farther south are two remarkable yellow rocks; at the north end of the rocky part, about 1¾ miles north of the south-east point, is a conspicuous tree with a straight trunk and thick crown. Farther south is a remarkable light green patch of reeds with a house near it on the beach, and near the south-east point is Penambulai village. Jambuai village lies on the south coast. Off the south-east point are five rocks covered with vegetation, the southern and largest being Julor islet. The east coast is fringed by reef, which from the north-east point projects north-eastward 1½ miles, with shoal patches, the outer one of which dries, lying one mile further north-east, and a shallow tongue continuing in the same direction to a distance of nearly 5 miles from the shore. Along the east coast generally the shore reef is from a half to about a mile in width; 2 miles southward of Tanjong Uafu Fenjuring there are outlying patches of 4¼ fathoms least water, sand, coral, and shells, distant about 2 miles from the shore. The north-west point is fronted by reef extending about half a mile off. Westward of this island lie Mimien, Kul Mimien, Lelamtuti, and Wolwa islands; they are divided from each other by channels which are partly dry at low water, the principal of which is Malmata Watu, along the west side of Penambulai, which is used as the means of communication between Lola and Jambuai villages. Northward of them all there is a channel leading through much shoal ground, up to the eastern entrance of Sungi Barkai or Koba.

Approach to Sungi Barkai.—Between Lola, the southern of the Meriri islands, and the north end of Penambulai, there is a 5-fathoms channel with some patches of less than 3 fathoms; it then trends south-westward between the east coast of Kobrur and Mimien island to the entrance of Sungi Barkai. No marks can be given for this channel; by it Lola village can be closely approached.

From seaward steer S. 27° W. for the sandy east point of Kangurma river until the south-west point of Meriri is in line with Seja islet, and Jarang islet is open south of Lola; then steer S. 59° W. until Epar islet is open westward of Lola, when alter course to S. 86° W., and when Lola bears N.E. steer S.W. towards the entrance of Sungi Barkai along the line of soundings shown on the chart; a dry patch is shown 5 miles south-west of Lola, in mid-channel. Vessels can anchor 2 miles south of Lola in 5½ or 6 fathoms, mud, sand, and coral (*Lat. 6° 16′ S., Long. 134° 51′ E.*). The flood stream at the entrance is believed to set southward and the ebb eastward. At the anchorage off Lola the ebb stream is considered to attain a rate sometimes of from 2½ to 3 knots an hour.

Sungi Barkai, the eastern entrance to which lies westward of Penambulai, forms one of the means of communication for small vessels between the east and west coasts of the Aru islands. The western entrance is navigable by larger vessels, and is narrow, but clear and very deep. The shore here is steep-to and rocky, but farther south the banks are covered with mangroves and fronted by flats dry at low water, consisting of mud with coral beneath. The channel here is clear in the middle and easy to navigate. Off Miniem island a large bank lies in mid-channel, with 11 feet on it; the course lies close along the island. At Njamuk island the channel is narrow, and there is often a strong stream; southward of this island are two reefs in mid-channel, with 2 and 3 fathoms on them respectively. Farther in the numerous islands, rocks, and reefs render navigation impossible except by small craft.

The depths found in the sungi during a passage through in the steam pinnace of H.N.M.S. *Banda* varied from 3 to 10 fathoms. The narrowest part is near the centre at Ajer Bunga Raja, where there is a spring of fresh water, and where the depth is 7 fathoms. The rate of the tidal stream here was 4 knots.

The eastern entrance has a S.E. by E. ½ E. and opposite direction for about 5 miles, and increases in width eastward to 1⅓ miles. In front of it lies a large mudbank, which extends 2 miles from the shores of Kobrur and Koba, with a least charted depth of one fathom; the eastern entrance has not been closely examined, but from the strong streams found here it is possible that deeper channels exist. Having passed the mudbank the deep channel is entered, leading north-eastward to Lola and the sea. There is no information respecting the route from the sungi to Barkai island.

Barakan island (*Lat. 6° 32′ S., Long. 134° 49′ E.*), lying southward of Penambulai and Jambuai, is about 5 miles long north-north-east and south-south-west, and thickly wooded. In some places, especially on the north and north-east sides, it is rocky. It is divided into two parts by a narrow sungi running from the north-west coast to a bay on the south coast. Barakan village is on the north point. The rocky north-east point is more easily made out from the northward than the south point of Penambulai, which then has Barakan behind it. The south-west point is named Tanjong Gom Gom Siang. The reef extends half a mile from the north-east side, about three-quarters of a mile from the sandy east side and 2 miles south-eastward from the south point; on the drying part south of Barakan is Wanai islet, covered with vegetation, which forms a good mark. North-west of Barakan is an extensive open space of little depth, mud and sand bottom, in which are some narrow channels only suitable for light craft.

Ketamba is a rocky wooded islet lying 2¾ miles westward of the south point of Barakan, and is surrounded by shoals.

Baun island, circular in form, with a diameter of about 8 miles, lies off the south-east end of Koba island and close westward of

Barakan, from which it is separated by a channel named Bulu Durjuri. The Sungi Wolai separates it from Barkai island to the southward.

Barkai (Workai) is a large island lying 8 miles eastward of the eastern end of Trangan island, the space between, in which are Fenjurin, Babi, and several other islands, being unsurveyed. Barkai is 12½ miles long N.N.E. and S.S.W., and 6 miles wide; it is covered generally with rather high trees, but affords few salient features. The north point named Kries serves as a mark for the entrance to the Sungi Wolai. Turtur Juring is separated from the north-east part of Barkai by a narrow passage, dry at low water; it is of moderate height and densely wooded. The east point may be recognised from the northward by the land just westward of it being lower, the point thus showing as a hummock.

The south point (*Lat. 6° 47′ S., Long. 134° 40′ E.*) of the island is a low cliff, on the summit of which is a conspicuous cocoanut tree rising above the others, which forms a good landmark. Under the cliff are situated the villages of Afara and Longar; on the south-east point is Baimun village.

The north-east coast of Barkai, of which Turtur Juring may be considered the extreme, is bordered by an extensive reef which extends 1½ miles northward and 3 miles eastward, embracing Bambu and four smaller islets; it also projects to a distance of 5½ miles, with a width of about 4 miles, in a southerly direction from Turtur Juring, the drying part extending 4 miles southward from that island; three-quarters of a mile south of Turtur Juring there is a sandbank above high water, and on the southern part of the reef stand the sandy and wooded North Kultubai islets, westward of which there is a broad shoal indentation in the reef leading up towards the villages of Gomo Gomo and Masian. The seaward side of this reef is about 6 miles distant from the east coast of Barkai, has depths of from 7 to 9 fathoms close outside it, and cannot be safely approached by the lead. On the east coast the reef dries off from a half to 1¼ miles.

The south-east coast of Barkai is low, wooded, and fronted by a coral reef which projects 8 miles eastward of the south point, and extends 8 miles south, including the Jin islands; this reef dries in places and there is a passage through it from the eastward, named Walorjin, which passes close to the south-east point of Barkai. On the north side of the eastern entrance to the Walorjin on the drying reef, is a small beacon, and on the shoal to the southward, a bush. In this locality are the best fishing grounds for pearl-shell and trepang.

Southward of North Kultubai islets there is a wide opening in the reef of Workai 5 miles deep westward and 3 miles broad, in which,

Chart 470, Aru islands. Var. 3° 20′ E.

except for some coral patches of 2¾ fathoms, the depths decrease gradually from 5 fathoms to the edge of the shore reef; the bottom is sand and mud. The edge of the reef on the south side of this space is marked by the high trunk of a tree with a topmark of dead cocoanut tree leaves; also the natives have marked the edge in places by beacons with a white flag as topmark, but these are not to be relied on, as when washed away they may not be replaced at all, or not in the same position.

The Jin islands lie on the southern edge of the reef extending southward from Barkai, and comprise six, mostly low, sandy islands lying east and west of each other.

South Kultubai (*Lat. 6° 52′ S., Long. 134° 45′ E.*), the easternmost of the group, often appears as two islands from north or south owing to a gap in the trees. Two remarkable trees stand close together near the west point, westward of the higher trees; from the southward they are only visible when bearing northward or eastward of N. 25° W. The reef extends about 1¼ miles southward and eastward, when its edge trends north-north-east; at 3 and 4 miles north-north-eastward from the island, on the reef, are two half-tide sandbanks.

Maarjinjin lies westward of South Kultubai, with the small narrow Wadidin islet between. Maarjinjin is divided in two by a narrow channel, dry at low water, running east-north-east and west-south-west. The trees are higher on the east side than on the west. On the south side near the beach is a conspicuous tree with a V-shaped top.

Jeudin island (Judei), the western and largest of the group, is about 6 miles long east-north-east and west-south-west and one mile broad. It is covered with trees, which are highest on the east side, and along the south-west coast there is much dead wood. The east point is a narrow spit with a row of high trees. The north side is swampy, and has an islet close off it. At about 2 miles west of the east point and near the south coast is a conspicuous tree with a high top; from the southward it looks like a church with a blunt tower. A coral reef with a dry sand cay on it projects one mile out from the south-west point, and the south shore is foul to the distance of a mile. There is good anchorage during the east monsoon in about 9 fathoms off the west end of the island, which is steep-to, whence to Longar and Gomo Gomo, a channel said to be intricate, leads between the reefs, with the least depth of one fathom as charted.

On the west end of Jeudin at springs the flood stream sets northward at 1·7 knots, and the ebb southward at the rate of 2 knots an hour.

General charts 942b, 2759a.

Chart 470, Aru islands. Var. 3° 20′ E.

Banda rock, about one cable in diameter, and with a depth of 3 fathoms over it, lies 3¼ miles S. by W. of the conspicuous tree on the south side of Maarjinjin island and 4½ miles north of Karang. It lies close to the 5-fathoms line off the Jin islands, and at 1¾ miles westward of it the depth is 3½ fathoms, at 3 miles eastward 4 fathoms, and at about half a cable southward 7 fathoms.

Karang island, lying about 8 miles southward of the Jin islands, consists of sand and coral, and is about one mile in extent, low and wooded, with trees about 100 feet high, those on the north-west side being higher than the rest. It is surrounded by a coral reef, which extends about 5 cables north-east and 7 cables south-westward, and is steep-to; the north-west side of the island can be approached to 1½ cables, and off it there is good anchorage in 7 fathoms. Near the west point of the reef there is a sandbank above high water. The island is not habitable on account of the mosquitoes.

Off the north-west side of Karang the flood stream sets north-eastward, and the ebb from south-west to west-south-west, both with a velocity of 1·7 knots.

Shoal.—At 4 miles N. 53° E. from the north-east point of Karang is a small shoal of sand, coral, and shells, with a depth of 2 fathoms on it.

Enu (*Lat. 7° 5′ S., Long. 134° 30′ E.*), the southernmost of the Aru islands, is nearly 4 miles in length, east and west, with a narrow coral reef around it. The island is wooded, and rises on its north-west side to a height of 100 feet. It is uninhabited, there being no good water on it. The south-east point is low, and ends in a spit of broken coral, off which there is a tide-race; from this point the 5-fathoms line juts out nearly 1¾ miles west-south-westward. Near the south-west point is a conspicuous group of casuarina trees.

Shoals.—At 3 and 5 miles westward of the south-west point of Enu are shoals of 4 and 3½ fathoms respectively; at 2 miles southward of the same point is a shoal with from 3 to 5 fathoms on it, and at one mile north-eastward from this shoal is a patch of 5 fathoms.

Anchorage.—Good anchorage will be found in a depth of 6 or 7 fathoms, coral, with the north extreme of Enu bearing East and the south-west point S. by E., or anywhere round the island.

Jei island, lying 6½ miles northward of Enu island and separated from Mar by a narrow channel, is 2½ miles long east and west, low, thickly wooded, and about 126 feet high to the tops of the trees, but with only a few trees on the south-east point; a narrow reef fringes the island, from which shoal water extends for nearly three

General charts 942b, 2759a.

miles from the southern side; shoal water also extends 7 cables from the east and north-west points. There is a lagoon in the north-west side of the island, where the natives catch turtle. The *Flying Fish* anchored off the west side of Jei in a depth of 6 fathoms, out of the tide and swell.

Tides.—It is high water, full and change, at Jei island at 4h. 20m.; springs rise 5 feet, neaps 3 feet. The streams are felt at the distance of 15 to 20 miles from the coast, flood setting to the east and ebb to the west; commencing between one and two hours after high and low water by the shore. The maximum rate of the flood stream is 2 knots an hour.

Mar island, on the southern end of an extensive drying reef between Trangan and Barkai (Workai) islands, is well wooded and 90 feet high to the tops of the trees; it is not inhabited. A drying reef extends 4 cables southward from the island, and off the south-east point, on the reef, is a small islet. Shoal water extends 2½ miles westward from Mar and narrows the channel between that island and Jei. There is a sand-cay, always dry, at 1¾ miles N. by W. ¼ W. from the north-east point of Mar.

The small wooded and uninhabited island Wolil lies 5 miles N.W. by N. of Mar, and stands on the same reef, as does also Fenjurin island to the northward; between Wolil and Mar the beginning of a channel was found, but it is very narrow and of no importance to navigation. The channel between Mar and Jei is used by praus; it has a least depth of 4 fathoms and the tidal streams are strong.

Fenjurin island, lying between Barkai and Trangan, comprises a number of islands separated by small sungis. It appears to be large, stony, and heavily wooded.

Karwai islet on the edge of the reef about 4½ miles westward of the south part of Fenjurin, has some conspicuous cocoanut trees in the centre.

South-east coast of Trangan.—The eastern part of this coast is low; the western part consists of low hills covered with vegetation, which descend steeply to the sea; eastward of the south point of the island are some low red cliffs. The western part of the coast to about 4 miles west of Tanjong Goljuring can be approached to a moderate distance, and good anchorage in the north-west monsoon can be had off it. Farther eastward are numerous reefs and small islets, generally with extensive drying banks.

Oud Krei (*Lat. 6° 46′ S., Long. 134° 25′ E.*) lies about 3 miles northward of Tanjong Goljuring. New Krei is about three-quarters of a mile northward of Kumnaar on the coast of Trangan. Laelaemaar river, which discharges northward of Tanjong Goljuring, is unimportant, and is only navigable by praus. It is 2 cables wide at the entrance, but soon decreases considerably in width above its confluence with a branch stream from Menoor village, and at Sia village is 65 yards wide. Although it is formed by fresh-water streams, the water at Sia is salt, even in the rainy season. At Sia the mangrove-covered banks give place to high banks of sand and undulating land about 33 feet high.

On each of the two drying reefs south-east of Tanjong Goljuring is a small house built on posts in the water, which are good marks.

From off Tanjong Goljuring to the westward is the western channel leading to Krei, mentioned hereafter, which lies between the coast and a fairly extensive reef, part of which dries.

Shoals.—Shoal patches of 2½ and 2¾ fathoms lie 7½ miles S. by E. from Tanjong Goljuring.

A reef with 1¾ fathoms least water lies about 3 miles E. by S. ¾ S. from Tanjong Ngabordamlu.

Approaches to Krei.—Krei, the principal village in the southern part of the Aru islands, may be reached by two channels. The western channel, with a least depth of 3 fathoms, runs close under the coast of Trangan, and is very narrow. It may be navigated by the lead and the estimated distance from the shore, and can be used at all times of tide.

Northward of Tanjong Goljuring the western side of the channel must be kept, to avoid a small drying reef off Biltubur village.

The eastern channel, with 3½ fathoms, although wider, presents more difficulty, and is only practicable when the reefs are visible, which is the case after half ebb. It trends in a northerly direction, passing close westward of Jei island.

Directions.—The west side of the small islet southward of Kumnaar in line with the east side of Karwai islet N. 14° W. should be an excellent mark; if the first-named island is not visible at a sufficient distance, then the east side of Karwai should be steered for on the bearing mentioned. This is not always easy, owing to the tidal streams, which are sometimes strong, not always setting in the direction of the channel, being influenced by some openings in the extensive drying reef around Fenjurin island. Care is required to avoid the shoal, with a patch of 8 feet on it, extending from the reef about west of Wolil island; the patch is steep-to on the channel side, and the lead gives no warning. Having passed this, steer between Karwai (*Lat. 5° 47′ S., Long. 134° 26′ E.*) and the drying reef south-south-west of it, and then northward towards the small islet lying about half a

Chart 470, Aru islands. Var. 3° 20′ E.

mile eastward of Oud Krei, off which the chart shows depths of 5½ and 6½ fathoms.

Winds and weather.—The north-west monsoon sets in definitely in the end of November with southerly and south-westerly winds, but soon assumes a north-west direction within a couple of points on either side. During December the wind blows feebly, with heavy rainstorms about midday. In January the force of the wind increases considerably with heavy squalls and much rain, and on the east coast the wind has a north-north-west direction. On the north and east coasts, as far south as Watulei, the ebb stream setting against the wind causes much sea; the force of the wind was observed to increase on the ebb.

During the second half of March the general direction of the wind was from north-west to west, but easterly winds were experienced a few times; rain storms occur about midday.

Variable winds are usual in April during the change of the monsoon; on some days south-west winds prevail, accompanied as a rule by much rain.

The east monsoon sets in about the 20th April with winds of little force, varying between S.S.E. and E.N.E., and accompanied by a long swell.

From the end of May to the middle of October the monsoon is generally strong between S.E. and S.S.E., reaching its greatest force in June and July, after which it decreases gradually in strength until October, when light variable winds and calms occur and continue until the latter part of November. The months of June and July are marked by a large rainfall, which decreases in amount as the force of the wind abates. During the change of the monsoon the weather is mostly dry. During the east monsoon the climate was cool, but hot at the change.

The rainy season is said to occur in the north-west monsoon, but rain falls every day in the south-east monsoon. The finest months are September and October, when but little rain falls. In October, however, during the survey of the *Flying Fish*, the land was always enveloped in thick haze, and seldom visible more than 2 miles off. In November the haze was not so thick as in October, and a few clear days were experienced. The mean temperature during the two months was 82°. Apparently the south-east monsoon lasts longer to the southward of the group than to the northward. Land and sea breezes prevail at Dobo (*Lat. 5° 45′ S., Long. 134° 14′ E.*) in November.

The climate of the Aru islands is said to be healthy, except in the first months of the south-east monsoon, when fevers and beri-beri are usually prevalent.

General charts 942b, 2759a.

Chart 470, Aru islands. Var. 3° 20′ E.

Tidal streams.—Along the western coasts of the Aru islands the flood stream sets southward and the ebb northward, the latter with more strength and longer duration than the former, but the velocity observed did not exceed 1½ knots. In the mouths of the sungis there is often a very strong ebb stream, lasting almost the whole tide, followed by a weak flood stream of only a few hours' duration.

The flood sets south-eastward and eastward round the south end of the islands, with a rate of 3 knots off Tanjong Ngabordamlu.

Along the north coast of the islands the flood stream sets S.E. by E. at about 2½ knots, and when eastward of the Jedan islands turns to the south-south-east, and continues mainly in that direction as far as eastward of Meriri, where it meets the flood stream which flows eastward round the south end of the islands, then east-north-east, and follows the trends of the east coast to the northward.

Where the streams meet, in the section between 6° 10′ and 6° 20′ south latitude, circular streams are formed, which with a rising tide set chiefly towards the shore, and with a falling tide to the eastward or away from it. Northward of the channel between Penambulai and Lola the streams appear to turn with the sun, and southward of the channel against the sun.

From the section above mentioned, the ebb sets north-north-east and north until east of Konan island, when it turns north-north-westward, and northward of the Jedan islands its direction is N.W. by W. The south-going ebb stream follows the trend of the reefs, but abreast the sungis which separate the islands, it takes a more easterly direction, often south-east.

At the full strength of the streams heavy ripplings are found off the north coast, caused by the uneven bottom, and near the south coast on the 7-fathoms line south-westward of Kultubai (*Lat. 6° 52′ S., Long. 134° 45′ E.*) and southward of the west point of Jeudin, which have the appearance of dangerous shoals.

The direction of the tidal streams on the east coast is much influenced and modified off the entrances to the various channels between the islands by the inset and outset of the streams through these channels, the effect being that on the whole the ebb stream sets more outward, away from the shore, than the flood sets inward.

Tides.—On the east coast during the months of November-January only one high and one low water in the day was observed, the water as a rule falling before and rising after midday; the fall was always more rapid than the rise. At neaps a short interval of slack water, or going back, was observed during the rising period; during this tide there was little or no stream.

General charts 942b, 2759a.

Chart 470, Aru islands. Var. 3° 20′ E.

The range at springs amounted to from 10 to 12 feet; at neaps, from 4 to 6 feet.

In the second half of March and September it was repeatedly observed that high and low water occurred twice a day on the northern part of the coast. The ranges were then, however, much less, and amounted at springs to 8 feet and at neaps to not more than 4 feet. As the vessel engaged in the survey never stayed long in one place, no exact account of the tides can be given. For tides at Dobo, Tanjong Ngabordamlu, and Jei island, *see* pages 190, 195, and 210.

Charts 942a, b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

SERWATTI ISLANDS include the long chain of islands which extend from the east end of Timor towards the Aru islands, and which terminate in the Tenimber or Timor Laut group. These islands may be said to be divided into two nearly parallel chains which approach each other as they near the coast of Timor. In the northern chain the principal islands are Wetta (not described in this work), Roma, Damma, Tau, Nila, and Serua, while the southern chain comprises Kissa, Letti, Moa, Lakor, Sermata, and Babar. The population of the group was estimated in 1882 at 53,000 inhabitants; of this number about 7,000 are Christians, principally on Letti, Moa, Roma, Kissa, and Luang. Posthouders are stationed at Damma, Letti, and Babar islands.

Roma island (*Lat. 7° 34′ S., Long. 127° 23′ E.*), lying about 45 miles northward of the eastern end of Timor, is 11 miles long north-east and south-west, and 6 miles wide; it is of good height, the highest summit having an elevation of 1,905 feet, and is of volcanic formation, but nothing is known of any eruption having ever taken place. On the north side are traces of volcanic activity, among them being some hot springs. View *a*, at page 216.

The island is fertile, and has a good climate; the most fertile part is the country adjacent to Rumah Kuda bay on the south-east side, where a small river flows into the sea. Good drinking water can always be had. On all the other sides of the island the shores are steep and rocky, and beaten by a heavy surf, which renders landing extremely difficult. From Rumah Kuda bay a good road leads to Jerusu village also on the south-east side of the island, picturesquely situated on the beach in front of a high white cliff; here water can always be had from wells.

The population in 1888 amounted to over 1,100, of whom about 300 were Christians, the rest being heathen. There are several villages in the island.

Anchorages.—Hila.—Anchorage in the east monsoon may be obtained off Hila on the west coast of Roma in 14 fathoms, with the

General chart 2759a.

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 40′ E.

south-west point of the bay bearing S. 64° W. and the north end of Nusa Niata island N. 9° W. As the bank is very steep and squalls off the shore are frequent, it is necessary to lay out a hawser to the shore.

There is anchorage off Diur village on the south coast of Roma in 13 fathoms on a coral reef, which extends westward from Tanjong Uwakeki, at about 1½ cables from the shore reef, with that point bearing N. 86° E. A reef extends off Tanjong Uwakeki, with some small rocks on it close to the shore.

Plan of Rumah Kuda bay and Nusa Mitan on 2465.

Rumah Kuda bay (*Lat. 7° 37′ S., Long. 127° 24′ E.*), on the south-east side of Roma, affords good anchorage in about 23 fathoms, sand and mud, at about 1½ cables from the shore, with the south point of Maopura bearing S. 87° E., nearly in line with the east point of the bay.

The shelter is good in the west monsoon, but the space is contracted, the bank steep, and there is only sufficient room for one vessel. A reef extends from the east point of the bay, which may be avoided by steering N.N.W. for the centre of the beach at the head of the bay.

In the east monsoon there is temporary anchorage off the north-west point of Nusa Mitan, where there is a sand beach. Anchored in 30 fathoms, sand, one swings clear of a rock, with one foot of water on it lying on the 5-fathoms line. Nusa Mitan is a rocky islet lying about 3 miles north-eastward of the south point of Roma. View *a*, at page 218.

There is temporary anchorage off Jerusu in 20 fathoms, sand and stones, with the flagstaff bearing N. 9° W. The shore reef here dries at low water, and 50 yards outside it the depth is 9 fathoms. The best landing place for boats is about half a mile westward of the village, but with any sea, landing is only possible in Rumah Kuda bay. The anchorage in Rumah Kuda bay or off Hila is preferable, if there is a likelihood of an easterly wind. A road connects Jerusu with Hila.

Chart 942a, Eastern archipelago, eastern portion.

There is also limited anchorage in Swan bay, a small indentation on the north coast, but it is only about 2 cables wide, and the depth is from 10 to 40 fathoms.

Nusa Niata islet lies 1½ miles north-westward of Roma; the chart shows a reef extending about 2 miles northward from the islet.

Maopura, lying 5 miles eastward of Roma, is low in the southern part, but the northern part rises to a peak, 1,028 feet in height; view *b*, at page 218. Juha islet, eastward of the middle of Maopura,

General charts 942a, 2759a.

is low. Kital and Tellang islands, the latter 645 feet high, with a small islet Nusa Laut north-east of it, lie north-west of Maopura. Maopura and Nusa Niata islands furnish excellent timber.

Reef.—According to the natives, a large coral reef, with a least depth of 4 fathoms on it, lies in mid-channel between the north-east coast of Roma and Tellang island.

Damma island, about 68 miles east-north-east of Roma, is circular, 8 miles in diameter, high and mountainous, with a smoking volcanic peak about 3,110 feet high on its north-east extremity; earthquakes occur, accompanied by a disturbance of the sea, but no eruption has taken place for more than 40 years. Some low land is found on the western side, but nearly everywhere else the coast rises steeply from the sea. The island is extraordinarily fertile, and has several small rivers. View *b*, at page 216.

The population, amounting to about 1,700, are all heathens, and are divided among ten villages on the north and east coasts. Wulur, on the east coast, at the head of Kulewatte bay, is the principal village, and the head-quarters of a Posthouder.

Plan of Kulewatte bay on 3440.

Kulewatte bay (*Lat. 7° 9′ S., Long. 128° 40′ E.*), on the eastern side of Damma, penetrates 4 miles into the land, with great depth of water, and is surrounded by high and very steep volcanic hills, thickly wooded to the water's edge.

At the head of the bay is Wulur village, and east-south-eastward of it on the north shore are the villages of Sollot and Kilie. The head of the bay is filled with reefs, which dry over a great part at low water. Between Sollot and Kilie the shore reef extends one cable off, and can be distinguished by the colour of the water; elsewhere the reefs are not so well marked.

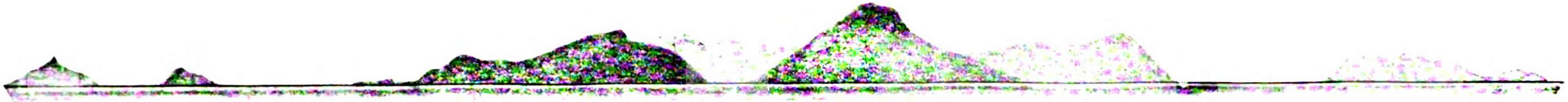
Wulur has some hot springs near it on the beach, and also at the mouth of a brook that discharges there. The water of the brook has a peculiar flavour, but the inhabitants use it without any bad results.

Anchorage.—There is very good anchorage at the head of the bay, where, however, there is but little room, the available space being about 2 cables in extent. The anchorage is in from 16 to 25 fathoms, with the low point near Sollot village bearing N. 43° E.; vessels must not anchor before that point bears eastward of North. The limit of the anchorage is the meridian of the point by Sollot village. During the south-east monsoon there is a heavy swell in the bay. There is no other anchorage.

Directions.—Kulewatte bay is easily entered, as there are no dangers. Approaching from the south, steer N. 78° W. for a flat hill

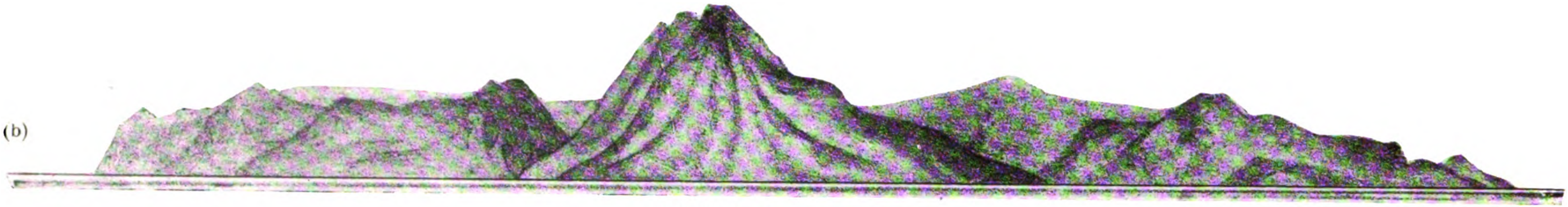
To face page 216.]

(a)



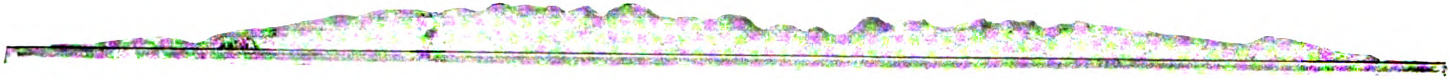
Roma and surrounding islands. Centre peak of Roma, South 24 m.

(b)



Damma island, distant 15 miles.

(c)



Letti island, South, 20 m.

Plan of Kulewatte bay on 3440. Var. 2° 40′ E.

to the left of Wulur village, which village is then hidden behind a point; when the village is in sight and bearing N.W. ½ N., steer for it and anchor as above directed. From the northward, steer along the northern shore of the bay at a distance of about a quarter of a mile until Wulur village comes in sight. The north side of the bay should not be closely approached, as stream and swell set strongly towards it.

Communication.—A steamer of the Royal Netherlands Steam Packet Company touches at Wulur, Damma, at intervals of eleven or twelve weeks; *see* page 17.

Tides.—It is high water, full and change, at Kulewatte bay (*Lat. 7° 9′ S., Long. 128° 40′ E.*), Damma island, at 1h.; springs rise about 7 feet.

The tide at Damma is mixed, with a preponderating double-daily character, which is most marked about the second half of March and September, when 0° moon's declination occurs two days after full and change.

The double-daily tide has springs 2½ days after full and change, with high water at 3h. and a mean range of 4½ feet; neaps at the same interval after the quarters, with high water at 9h. and a mean range of 1½ feet.

The single-daily tide has high water on the 1st January about 9h. p.m.; 1st April, 3h. a.m.; 1st July, about 9h. a.m.; and 1st October, at about 3h. p.m.; springs occur one day after the moon's half-monthly greatest declination, with a range of 3 feet, and neaps at the same interval after 0° moon's declination, with a range of one foot. About the second half of June and December, these ranges increase to 3½ and 1½ feet; about the second half of March and September they decrease to 2½ feet and more than 6 inches.

The high waters of the two spring tides fall together about the beginning of the months of April and October; the highest level is then reached at about 3h. a.m. and 3h. p.m., respectively.

When 0° moon's declination occurs 2 days after the quarters in the second half of March and September, the movement of the water reaches a minimum.

Chart 942a, Eastern archipelago, eastern portion.

Anchorages.—Wilhelmus bay, on the north side of the island, is entirely exposed and affords very bad anchorage in 29 fathoms, a heavy sea tumbling in during both monsoons; the holding ground is bad and the bank very steep; still, the anchorage is said to be better in the south-east monsoon than that of Kulewatte.

General charts 942a, 2759a.

Plan of Batu Merah anchorage on 2465. Var. 2° 40′ E.

There is also anchorage off Batu Merah (literally red rock), on the north-west side of Damma, about one cable from the shore, and on the edge of the reef, in a depth of 20 fathoms, outside which position the water deepens very quickly.

Chart 942a, Eastern archipelago, eastern portion.

Terbang islands.—North and South Terbang islands lie south-south-westward of Tanjong Achir, the south point of Damma island. They extend over a distance of 7 miles north and south, and are about 1½ miles apart; the northern end of North Terbang lies south-west 5 miles from Tanjong Achir, as charted. North Terbang is 458 feet high a little northward of the middle. The north end of South Terbang is low, but southward is a plateau 408 feet high, steep on the north side, but sloping gently to the south point. Both islands are surrounded by reefs, which extend about one mile from the east and west sides. At about 13 miles westward of Tanjong Achir are two small wooded islands, 98 and 128 feet high respectively, but there is no further information about them.

Charts 942a and b, Eastern archipelago, eastern portion.

Tau island (*Lat. 7° 2′ S., Long. 129° 8′ E.*), 25 miles E. by N. ½ N. from Damma, is about 5 miles in length, north and south, and consists chiefly of an active volcano, which rises to a height of 2,230 feet. The island is fertile, and a great part is covered with cocoanut trees. The number of the inhabitants is estimated at about 1,300; many of them can speak the Malay language. There are two villages on the south coast and two on the west coast.

Foul ground.—Lieutenant Kolff reported in 1826 that the channel between Tau and Nila was unsafe on account of the reefs in it, but H.N.M. brig *Meermin* in 1840 only saw current rippling; until the channel has been examined caution is recommended.

Anchorage.—Off Lajani village on the south-west side of Tau there is anchorage in 10 fathoms, with the church bearing N. 55° E., and the north point of the small bay N. 28° W.

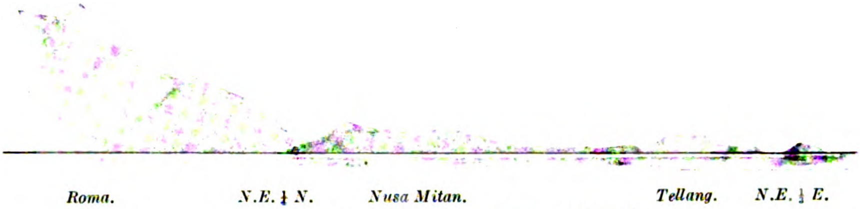
The church stands near the beach in a small bay, and is conspicuous. The west shore of the bay is cliffy and high; the east side is rocky but low.

Chart 942b, Eastern archipelago, eastern portion.

Nila island, about 24 miles north-eastward of Tau, rises on its eastern side to a precipitous and still active volcano, 3,908 feet high. A reef with the small islet Nika on it extends 1½ miles from the north end of Nila. The natives, estimated to number about 1,200, are

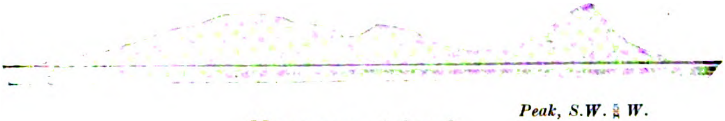
To face page 218.]

(a)


Roma.
N.E. ¼ N.
Nusa Mitan.
Tellang.
N.E. ½ E.

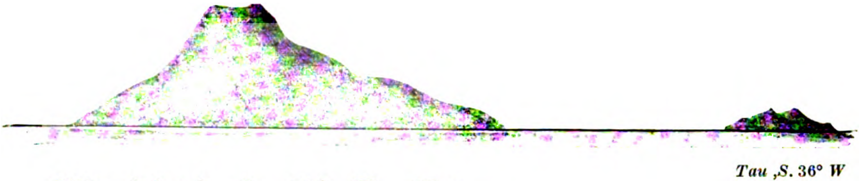
Roma and neighbouring islands.

(b)



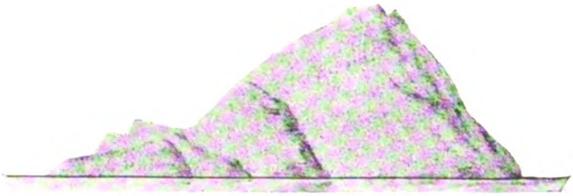
Maopura island.

(c)



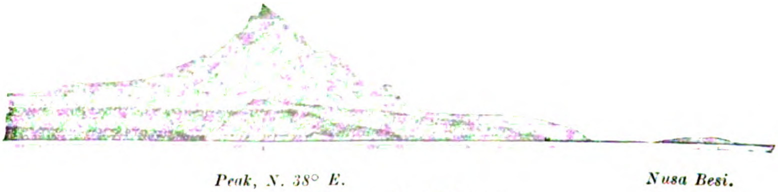
Nila island, S. 19° W. 32 m.

(d)



Serua island, N. 89° E. 21 m.

(e)


Peak, N. 38° E.
Nusa Besi.

N.E. point of Timor.

gentle and good-natured; they raise hogs, poultry, and also cocoanuts for sale at Banda. Rumadai village lies on the north-east coast and Wotai on the south coast. View *c*, at page 218.

Plan of Nika anchorage on 2465.

Anchorages (*Lat. 6° 43′ S., Long. 129° 32′ E.*).—On the north side of Nila island there is anchorage from 4 to 5 cables westward of Nika islet. A narrow channel between reefs leads to this anchorage, the navigable width of which is reported to be only one cable, with a depth of 4 fathoms at low water on the bar, which consists of a very steep ridge of sand with black stones. The shore around the anchorage abounds with hot springs, and on the south shore there is a hot mud spring. The depths at the anchorage are from 15 to 20 fathoms; south-west from it lies a bank with 6 fathoms least water, and westward of it discoloured water was seen. Two small islets lie near the south shore, but they are difficult to make out.

In making for Nika anchorage care must be taken to keep the summit of the larger and outer islet on the south shore bearing S. 3° E., as the channel is narrow and the tidal streams set across, and anchor when the summit of Nika islet bears E. ½ N. The centre of the highest summit of Nila bearing S. 4° W. also leads through, but this mark is not of much use in such a narrow channel owing to the distance of the mountain. It is recommended to examine the approach to the anchorage before using it, and to mark the reefs on either side by a boat.

Another narrow channel lying east and west leads to this anchorage, but particulars are wanting.

Plan of Wotai road on 3440.

There is anchorage off Wotai village in a small bay on the south coast of Nila. The bay is quite open to the southward, and from the high cliffy coast a wide steep-to reef extends, dry for the most part at low water. On the outer part of the bank the depths are very irregular, there being from 22 to 30 fathoms on the outer edge at about 1¾ cables from the drying edge of the reef. At about 3½ cables southward of the village and three-quarters of a cable from the edge of the shoal water is a coral patch of 3 fathoms, the depth between it and the reef being from 10 to 21 fathoms. Anchorage in about 12 fathoms will be found with the village bearing N. by W. ¼ W. and Tanjong Silanenrieren E. ¼ N.

Chart 942b, Eastern archipelago, eastern portion.

Dusborgh reef was reported in 1870 by the Dutch brig of that name as lying about 6 miles north-west of Nila island; no particulars were given. The reef is charted about 11½ miles N. 75° W. from the west point of the island; at about 9 miles westward of the same point a large extent of discoloured water was seen, but no bottom was obtained at 30 fathoms, in a position 1½ miles southward of the discoloration.

Reef.—A coral reef lies about 2½ miles north-westward of Nila island. It is an atoll, 2¼ miles in length, with a small opening on the eastern side. The outer edge, consisting of sand, dries.

Griffin reef (*Lat. 6° 35′ S., Long. 129° 52′ E.*), or Nil Desperandum, 21 miles N. 63° E. from the north-east point of Nila, is composed of sand and coral, and dries 6 feet; it extends three-quarters of a mile east and west, and is half a mile broad.

Serua island, about 40 miles north-east of Nila, is an active volcano, rising to a height of 2,294 feet. The shores descend steeply to the sea. A great part of the island is covered with cocoanut and mango trees. View *d*, at page 218.

The population, numbering about 1,300, is still very uncivilised, and is divided over three villages.

The Netherlands Government steam vessel *Arend* anchored off the north side of the island in 39 fathoms, sand, with the village of Isloro bearing S. 18° W. Praus are built here, and there is a serviceable road to Tarana village, situated in the saddle between the volcano and a hill westward of it.

Kekeh besar and kechil are two islets about a cable apart and connected by a reef, lying westward of Serua. The passage between Kekeh kechil and Serua is half a mile wide, clear and deep.

Chart 942a, Eastern archipelago, eastern portion.

SOUTHERN CHAIN of SERWATTI ISLANDS.—

East point of Timor.—Timor island itself is out of the scope of this work, but it is convenient to note here that the East point is high and the coast steep-to. A range of mountains from 2,653 to 3,048 feet high traverses the point not far from the coast in a N.N.E. and S.S.W. direction. The inhabitants at this part appear to be very shy. View *e*, at page 218.

Nusa Besi, off the east point of Timor, is a small flat uninhabited island appearing as a tongue of land before it opens from Timor. The island is circular, 2½ miles in diameter, and wooded, the tops of the trees being 350 feet above the sea. A coral reef fringes the island, varying in width from a few yards on the western side to about 3 cables on the north and south sides.

The channel between Besi and Timor is 3 to 4 cables wide and perfectly clear, carrying a depth of over 10 fathoms right through, and is very easy for a steamer to navigate. There is excellent anchorage in the northern entrance, in a depth of 13 fathoms, sand and coral, about a quarter of a mile from the shore, with the north point of Nusa Besi bearing S. 86° E., and the eastern extreme of Timor S. 7° W. At springs, the tidal streams have been found to run regularly in this channel, and to attain a maximum rate of 3 to 4 knots, forming strong eddies.

Kissa island (Makisar) lies 18 miles north-north-west of the east point of Timor, and is about 7 miles long north and south, by 5 miles broad. It is stony and hilly, the highest point having an elevation of 787 feet. The coast is high and rocky, broken in places by narrow sand beaches, generally where gaps in the coast give access to the interior. The chart shows reefs extending off the south-west and south-east points. There are no rivers; on the west side there is a small stream that dries up in the east monsoon; at the end of that season drinking water is very scarce. A great part of the island has no wood on it, which has a pernicious effect on the climate and cultivation. Owing to want of rain a whole year sometimes passes, during which the inhabitants are without vegetable food. In 1885 not a drop of rain fell. At such times many of the people remove to Roma. The climate appears to be very unhealthy, and fevers are prevalent from September to March.

The population is estimated at about 9,000, of whom about 1,000 are Christians. They are generally very poor. The island is under the authority of a rajah, who lives at Waurili, on the south-west side of the island. There are also villages on the east coast; one, named Pura Pura, is connected by a road with the west side of the island. The village is not visible from the sea; the coast here is rocky and steep-to, but a small inlet with a sandy beach offers a place where laden boats can get close to the shore in the north-west monsoon. There is no anchorage here.

Plan of anchorage on the west side of Kissa island on 1460.

Anchorage (*Lat. 8° 7′ S., Long. 127° 9′ E.*).—There is anchorage during the south-east monsoon in a bight to the northward of the south-west point of Kissa on a bank or strip of sand and rocks, with very irregular soundings of from 5 to 28 fathoms on it. It is not suitable for large vessels, and is always more or less dangerous on account of the heavy squalls which occur here.

The shore of the bight is a sandy beach, on the northern part of which are the ruins of a fort.

The *Nautilus* anchored in 7½ fathoms, three-quarters of a cable from the shore, with the old Dutch fort bearing N.N.E. and the south-west point S. ¾ W., and secured to the shore by a hawser. There is a

Plan of anchorage on west side of Kissa island on 1460. Var. 2° 30′ E.
village near this anchorage, but the principal village of the island, Waurili, is about 2 miles inland up a valley.

Directions.—A vessel proceeding to the anchorage on the west side of Kissa island should bring a post, placed in a small wall of heaped-up stones, situated about 8 cables southward of the old fort, to bear S.E., and stand in slowly for it on that bearing, anchoring when a depth between 27 and 22 fathoms is obtained; it would be prudent to send a boat ahead to pick up a sandy spot. If remaining any time a hawser to the shore is necessary.

Supplies.—Water can be procured from the beach on the west side by the old Dutch fort. Cattle, sheep, goats, pigs, fowls, and ducks can be obtained.

Trade (*Lat. 8° 7′ S., Long. 127° 9′ E.*).—The chief articles of trade are sandal wood, bees-wax, tortoise-shell, and trepang.

Communication.—Vessels of the Royal Netherlands Steam Packet Company on the route from Surabaya to Port Darwin, call at Kissa island every four weeks, both on the outward and return voyages. The steamers do not anchor; laden boats land at the place where Waurili village is shown on the plan; on the beach by the discharging place are some sheds. At half a cable from the beach is a narrow reef, dry at low water, which acts as a breakwater, and has deeper water inside it. A shallow channel leads over this reef near the discharging place which a boat can use at low water, but laden boats can only get near enough to the beach to load or discharge between half tide and high water.

Chart 942a, Eastern archipelago, eastern portion.

Letti island, 23 miles N.E. by E. of the east point of Timor, is 9 miles long east and west, and about 5 miles wide. A range of dome-shaped, unwooded hills, rising to 1,403 feet above the sea near the centre, traverses the middle of the island from east to west. The coast rises nearly everywhere in steep, bare cliffs to a height of from 60 to 200 feet. At the east end of the island a spit with a sandbank extends out about one mile, and the shore is fringed with reef, partly dry, to a distance of half a mile. Probably in consequence of the absence of trees the island is generally barren; sometimes a year passes without rain. The stock of cattle is important. The population in 1888 was estimated at over 7,000, of whom about 750 were Christians; they live in various villages, which, with the exception of the Christian villages of Serwaru and Sera, are situated on high rocks and surrounded by stone walls. View *c*, at page 216.

The natives are not so civilised as those of Kissa, neither are they so prosperous. The produce is similar to that of Kissa.

General charts 942a, 2759a.

Plan of anchorage on north side of Letti island on 1460. Var. 2° 30′ E.

Serwaru anchorage (*Lat. 8° 10′ S., Long. 127° 41′ E.*).—During the south-east monsoon the best anchorage is on the north side of the island, off the village of Serwaru, where the fringe reef is only 1½ cables wide, and the depth increases from 5 fathoms at the edge of the reef to 25 fathoms at half a mile from the shore. The anchorage is in a depth of 12 to 15 fathoms, with the highest mountain top in line with the church bearing S. 2° E., and the north point of the island S. 87° E. The church must not be mistaken for the dwelling of the Posthouder, situated some distance westward of it, and nearly hidden by trees; in front of this house is a mole, but there is no landing there. The bottom is irregular and the holding ground bad.

Serwaru village lies on a bare strip of coast with a white sand beach. The coast remains low for some hundreds of yards eastward of the village, when it becomes steep and cliffy, and forms a small bay, sheltered from westerly winds by a mole built of coral stones; eastward of the mole is the landing place, with two huts near it on the beach. Eastward of the anchorage, a reef extends a considerable distance from the cliffy shore, and westward of the mole before the Posthouder's house a reef, entirely dry at low water, fronts the shore. The depth close to the shore by the landing place is 3 fathoms, with 4½ and 5½ fathoms a short distance farther out.

Discharge and embarkation of cargo can only be effected with high water, on account of the reef which fringes the coast; these operations, therefore, are carried out slowly. Landing is difficult with any sea.

Very small vessels can avail themselves of an opening in the reef off Tombra, a village lying one mile westward of Serwaru; this opening is 150 yards wide and 6 to 9 fathoms deep, with a bottom of sand and mud; the reef on either side is exposed at low water, and vessels can moor alongside it. During the north-west monsoon there are no safe anchorages.

Communication.—The vessels of the Royal Netherlands Steam Packet Company call at Serwaru as at Kissa; *see* page 222.

Chart 942a, Eastern archipelago, eastern portion.

Moa island, 3½ miles east of Letti, is about 23 miles long east and west, and is divided into two hilly parts by a strip of low land about 100 feet in height. This low land is marshy and thickly wooded with sago trees. The ridge of hills in the western part of the island has a greatest height of 984 feet; that in the eastern part is less extensive but higher, its most elevated summit, Mount Karbau (Buffalo) rising to a height of 1,314 feet above the sea. The hills are densely wooded. Reefs extend from the east, south-east, and south-west points.

General charts 942a, 2759a.

The island is very fertile; the inhabitants of Letti generally remove temporarily to Moa in times of scarcity. The population numbers over 3,000, of whom about 200 are Christians, and live in nine villages, the principal one being Pati (*Lat. 8° 13′ S., Long. 127° 52′ E.*) on the south coast, where the chief resides; here are a stone church and the remains of a blockhouse. Moa produces cattle, goats, pigs, and fowls.

Anchorages.—Owing to its steep-to coasts Moa has no safe anchorage, and the island should only be visited at the time of the change of the monsoon.

In the east monsoon, a vessel may with some trouble anchor off Kaiwatu on the north coast, but not in the west monsoon.

Off Pati village on the south-west side of the island there is indifferent anchorage, but it should only be used in calm weather and not by a large vessel. Vessels using this anchorage approach it slowly with the anchor hanging at the end of 35 fathoms of chain, steering for the church on a N. 41° E. bearing. The bottom in the anchorage is of soft mud, and with the anchor holding in about 35 fathoms, a vessel will swing clear of the drying shore reef with a short scope of cable.

There is better anchorage off Klis village about 5 miles eastward of Pati, in 34 fathoms sand, at about 1¼ cables from the shore reef, which is half a cable wide and dries, on the bearings, flagstaff N. 44° E., east point of Moa, S. 32° E.

The channel between Letti and Moa islands is clear of danger, with the exception of the shore reefs, which extend about 5 cables off Letti and 3 cables off Moa, and which are very steep. The tidal streams are strong.

Lakor island, separated from the south-east coast of Moa by the narrow strait of Lakor, consists of hard coral rock raised about 20 feet above the sea, and generally bare and infertile, with here and there patches of cultivation and cocoanut trees on the sandy spots. The tops of the highest trees are about 170 feet above the sea. The coast is rocky, varied in some places by sand-beaches, and is bordered by a reef that dries to a distance of one cable from the shore. The soil is suitable for the cultivation of tobacco, and most of that used in the neighbouring islands is grown here. There are no rivers. Water is obtained from wells, and most of the necessaries of life are imported from other islands. The population is poor, and amounts to over 3,000, all heathen, and divided among 10 villages.

Anchorage for small and short vessels may be had in the east monsoon off Warworong village on the north side of Lakor, in

20 fathoms, on the edge of the reef, but the bottom is very steep and the anchorage bad.

Brisbane islet, or Meaty Miarang, about 16 miles S. 80° E. from the south-east point of Lakor island, lies on the south point of a large drying reef that extends in a north-north-west and south-south-east direction for 12 miles with a greatest breadth of over 5 miles. The islet is densely wooded, the tops of the trees being 115 feet above the sea. South-westward of it is the low wooded islet of Morauw and south-eastward is another islet. On the north point of the reef lie two islets, Meaterialam and Amortaun. The reef rises steeply from the sea, and there is no anchorage outside it. Within the reef and extending over nearly its whole length is a basin or lagoon, with an entrance on the eastern side three-quarters of a cable in width, in which the least depth is 4 fathoms.

The entrance to this channel is about 3 miles northward of Brisbane islet, and is marked on the starboard side entering by a white conical buoy and a white ball beacon, and on the port side by black can buoy and a black cone beacon. A S. 40° W. course leads through the channel.

In the lagoon are numerous reefs, but the southern part is beaconed, so that the anchorage westward of the north point of Brisbane islet, in 13 fathoms, can be approached without difficulty.

LIGHT (*Lat. 8° 20′ S., Long. 128° 30′ E.*).—A *white group flashing* light showing *two* flashes in quick succession *every ten seconds*, is exhibited at an elevation of 75 feet above high water from a white iron framework tower, having at its base a white dwelling with a red roof, situated on the west side of Brisbane islet; the light is visible 14 miles in clear weather.

Tides.—The *Brisbane*, which struck on the reef off the islet of that name in January, 1880, gave as time of high water 11h., and the rise of tide 6 feet. The flood stream sets to the west and the ebb to the east, only one low water was observed in 24 hours; the wind at the time was W.N.W. blowing fresh.

Luang island, 27 miles eastward of Lakor, and 14 miles north-eastward of Brisbane islet, is about 5 miles in circumference, and, being high with a double top, is visible at a considerable distance; it is surrounded by an extensive reef, about 11 miles long east and west, and partly dry at low water, but the southern limit of which is undetermined. On the reef are several islets, and there is no anchorage outside it. Small craft can pass over the reef at high water, at which time the depth on it is 6 feet, to a basin with 5 fathoms of water and sand bottom, close to a village on the north side of the

Chart 942a, Eastern archipelago, eastern portion. Var. 2° 40′ E.

island. The slopes of the hills are covered with thin grass and a few clumps of trees; the scarcity of trees causes the island to be barren. There are no streams on the island and only two wells, the water of which is brackish. The products of the island are chiefly turtle and trepang; some of the inhabitants are very skilful in making gold and silver ornaments.

Luang is the only inhabited island of the group, the natives, among whom are many Christians, are divided among six villages, mostly on the north-east side of the island, and situated on rocks, with strong walls around them. The Luangers are good seamen, and extend their voyages to Timor. For the islands in the neighbourhood Luang is an important trade centre.

Kalapa islets lie about 2½ miles east-north-east of Luang; close outside of these the reef is steep-to.

Charts 942a, b, Eastern archipelago, eastern portion.

Sermata island, 7 miles eastward of Luang, is about 13 miles long, and is composed of a high range of hills, extending east-south-east and west-north-west, the sides of which slope steeply down to the sea; the highest summit, near the west point of the island, is about 1,378 feet high. There is only one small stream in the island, which discharges at Gerwati village on the north coast. The island affords scarcely any shelter to shipping.

The inhabitants are heathens, and are divided among 12 villages, situated on the coast and surrounded by high, thick, stone walls. They carry on trade with Luang and other islands.

Plan of Sermata west point on 3440.

Anchorage (*Lat. 8° 12′S., Long. 128° 49′E.*).—There is anchorage close northward of the west point of Sermata, from which a reef projects that dries partly at low water.

The plan shows a bank of very irregular depths of from 5 to 29 fathoms, which extends one cable from the shore in a north-west direction, on which there is anchorage three-quarters of a cable from the land, with the extreme west point of the island bearing South and a stone near the shore S. 65° E.

There is also anchorage with the west end of the island bearing S. 29° W., and the north-east point N. 74° E.

Chart 942b, Eastern archipelago, eastern portion.

BABAR ISLAND, about 40 miles east-north-eastward of Sermata, is 16 miles long north and south, and the same in width in the northern part, whence it tapers southward, and at its southern end it is 4 miles wide; it is mountainous to a height of 2,953 feet above

General charts 942a, 2759a.

the sea, and covered with forests. The lower mountain chain appears in the form of coffins. The coasts are low, sloping down from the hills, and are thickly wooded. The island is fertile. It is fringed in many parts by a reef that dries and extends from one to 1½ cables from the shore.

The inhabitants, almost exclusively heathen, are estimated to number about 8,000. There are 20 villages, all situated on the coast. The principal village, Tepa, on the west coast, is the only one not built on a steep height, and is the head-quarters of a Posthouder.

Reefs.—A reef about one cable in extent and steep-to, on which the depth is 4 fathoms, lies about 3 miles N. 75° W. from the south-west point of Babar.

A reef is charted about 4 miles northward of the south-east point of the island and one mile off-shore. Off Letwurong village and half a mile from the shore, is a reef one mile in length north-north-west and south-south-east and half a cable broad, on which the least depth is 3 fathoms, at the northern end. There are several smaller islands near Babar, that of the most importance being Wetan, which lies off the west coast.

Plan of Tepa road on 2465.

Tepa road (*Lat. 7° 52′ S., Long. 129° 36′ E.*).—During the south-east monsoon, the best anchorage is abreast of the village of Tepa, on the west side of Babar island, where a vessel may lie securely in a depth of about 8 fathoms, with the coal store bearing S. 83° E., distant 3 cables; this position is about one cable outside the 5-fathoms line, and three-quarters of a cable from a reef covered by one fathom in the northern part of the roadstead, and marked at its south-west edge by a black conical buoy. Great caution is required in sailing vessels when beating up to the anchorage, as the wind frequently comes off the high land in sudden squalls.

During the north-west monsoon there is sometimes much sea in the road and breakers on the coast, but it must blow hard to cause a vessel to drag. In this monsoon it is recommended to anchor in about 25 fathoms, with the black conical buoy bearing E.N.E. There is also anchorage in from 6 to 13 fathoms, mud, about 2 cables north of the one-fathom shoal and the same distance off-shore. There is room in the road for several vessels.

The easiest landing place for boats is at the village, or farther north at the entrance of a small creek.

Directions.—Approach the anchorage steering East for the flag-staff in front of the Posthouder's house, and anchor in the required depth. The tidal stream often sets strongly north or south, and

Plan of Tepa road on 2465. Var. 2° 30′ E.

should be guarded against. When nearing the road the depths decrease suddenly. It is recommended to lower the anchor with about 15 fathoms of chain from the bows, and to approach as slowly as possible. In the west monsoon 25 fathoms of chain should be veered out, and the black buoy not brought to the northward of E.N.E. If, in the west monsoon, it is not possible to discharge in Tepa road, a blue flag is hoisted, and the vessel proceeds to Herile on the east side of Wetan.

Supplies.—Cattle, pigs, goats, and other provisions can be procured at Tepa. The Dutch government have a small depôt of coal there for the use of the gunboats.

Communication.—The vessels of the Royal Netherlands Steam Packet Company on the route from Amboina to the Tenimber and Aru islands and Merauke, call at Tepa every alternate month on the outward voyage, and on the other months on the return voyage; page 17.

Chart 942b, Eastern archipelago, eastern portion.

Anchorages on the coast of Babar.—From the south-east point of the island the reef extends about 1½ cables, and good holding ground in 6 to 7 fathoms, sand, will be found at a mile from the shore.

Off Tutuwawang (*Lat. 8° 0′ N., Long. 129° 46′ E.*), on the east coast, there is anchorage in 17 fathoms outside the reef, through which a 3-fathoms channel leads to a sheltered anchorage for small vessels.

The shore reef here is 1½ cables wide; the village of Tutuwawang is the southernmost on the east coast, and is situated on a high rock. Northward as far as Letwurong village the shore reef does not exceed 1½ cables in width, and there is anchorage everywhere in about 15 fathoms, sand: as the reef is composed of very irregular rocks, landing in boats is difficult and in the south-east monsoon impracticable.

There is good anchorage northward of the reef previously mentioned as lying 4 miles north of the south-east point of Babar, off the village of Wakpapapi, in 17 fathoms, at 2 cables from the shore. Three houses on the beach, northward of the village, bearing N. 40° W., lead north-eastward of the reef, between which and the shore there is no passage.

Off Letwurong village on the east coast there is anchorage between the village and the reef previously mentioned as lying half a mile from the shore, in 13 to 15 fathoms, sand, with the village bearing S. 69° W.

On the south coast of Babar there are two bays in which there is anchorage. In the easternmost there is anchorage in 7 fathoms, sand,

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

with the west point of Masela bearing S. 27° E. and the west point of the bay N. 85° W. A reef with breakers on it extends 1½ cables from the eastern point, but round the bay the shore consists of a sloping beach, for a great part without reef. Landing is easy except when the south-east monsoon is strong. At the head of the bay is a creek.

In the western bay, where Ampelawas village is situated, the shore reef is half a cable wide, partly dries, and much obstructs landing. There is anchorage in front of Ampelawas village in 20 fathoms, mud, at about 1½ cables from the shore, with the west point of Masela bearing S. 34° E. and the east point of the bay N. 87° E.

On the south-west coast of Babar there is anchorage in 30 fathoms, sand, off the villages there.

Wetan island is 6 miles in extent north-north-west and south-south-east, and rises to a height of 886 feet at the northern end, and 1,152 feet at the southern extremity, the intermediate land being low. The coasts are low and wooded; the southern part of the island alone is somewhat fertile. A reef projects from the south-west point of Wetan. The population is about 2,000, divided among nine villages.

Plan of Babar strait on 2465.

Babar strait (*Lat. 7° 52′ S., Long. 129° 35′ E.*), which separates Wetan and Babar islands, is clear and deep, and about one mile wide in the narrowest part.

Anchorage may be had off Herile village on the east side of Wetan at the narrow part of Babar strait, in 27 fathoms, with a hawser to the shore. In the west monsoon vessels wait here for a favourable opportunity of going to Tepa. The strait is open to the swell, which is troublesome, but the anchorage is comparatively safe.

There is also anchorage off Upuhupun village about 2 miles to the southward.

Chart 942b, Eastern archipelago, eastern portion.

Dai island, 13 miles north of Babar, is about 4 miles in length, and rises to two summits, the highest of which has an elevation of 2,362 feet. The island rises in terraces, with steep slopes and deep, densely wooded ravines on the north side. A great part of the terraces and slopes is covered with reeds, with palms here and there, and on the north side many cajaput trees. On the south and south-west sides are low points, with sandy flats covered with vegetation. There are two bays on the south side; Hernuti village is situated on the eastern and Manumerah village on a sandy flat on the western bay.

On the north side there are also two bays; on the western of these, nearly on top of a hill and hidden by trees, is Luturlawang village.

General charts 942b, 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

In the eastern bay on the north side there is anchorage in 25 fathoms, sand, stones, and broken shells, close to the shore, with a short scope of cable. It is not very safe, and is exposed to wind and sea from every direction with northing in it; the bottom is very steep. Lebia village is situated on this bay, and a boat can land in calm weather; there is no other anchorage off Dai island.

Landing is impossible with boats except on the eastern part of the north coast, as the shore is bordered by a narrow reef, on which there are always breakers. Communication can be made by outrigger praus. At less than a cable from the south coast the depth is 100 fathoms.

Dawalur and Dawera islands, lying 10 miles north-eastward of Babar, are high, and resemble each other when seen from the eastward; Dawera is 1,134 feet high. The islands extend over a distance of 8 miles north-west and south-east. Both islands consist of terraced sandstone, and are but little wooded. They are separated by a narrow strait with reefs on either side and in the middle of the passage; reefs also extend some distance westward from the south-west point of Dawalur and the west point of Dawera. The population of Dawalur is about 800, and of Dawera 1,000.

Plan of Watteweh road on 2465.

Watteweh road (*Lat. 7° 46′ S., Long. 129° 59′ E.*), at the north-west end of Dawera, affords fairly sheltered anchorage in 12 or 13 fathoms in an opening in the shore reef, with the north-west point of Dawera bearing N.E. and Motimete village, close eastward on a hill, East.

Chart 942b, Eastern archipelago, eastern portion.

Masela island, 6½ miles south-east of Babar, is 9 miles in length, north-north-east and south-south-west, and 837 feet high. It is surrounded by a reef which dries to a great extent, and which extends about 3 cables from the western side of the island, apparently about 2 miles south-eastward from the south side and about one mile from the rest of the island. The population is about 2,000, divided among 12 villages.

Plan of Lawawang road on 2465.

Anchorage may be had in Lawawang road, on the west side of Masela island, in a depth of from 4 to 5 fathoms on a narrow bank, which trends parallel with the shore at a distance of about 4 cables. A reef extends about 2 cables from the shore, with here and there large rocks above water. Boats can only land near high water. The village of Lawawang is south-eastward of the anchorage on a hill

Plan of Lawawang road on 2465. Var. 2° 50′ E.

80 feet high, and is visible above the cocoanut trees. It is surrounded by a wall of loose stones. The tide rises from 6 to 7 feet.

Chart 942b, Eastern archipelago, eastern portion.

Off the south-east point of the island there is anchorage in 13 to 15 fathoms, but only in calm weather, near a wide opening in the reef that leads to a low sand-beach, on which are some houses belonging to Telolora village.

There is also anchorage in front of Mahela village, on the east coast (not shown on the chart), in 9 fathoms, sand, shells, coral, and small stones, the bottom sloping regularly. The beach is of white sand, with a number of cocoanut trees on it, and backed by high cliffy land. The beach extends over a length of about 3 miles.

TENIMBER ISLANDS.—This group, the easternmost of those which extend from Timor towards the Aru islands, consists of several thickly-populated islands, of which Timor Laut, or Yamdena is the principal; they are almost all formed of coral apparently recently raised above the sea, and with the exception of the east coast of Timor Laut and the outlying islands, Vordate, Molu, Maru, Laibobar, and Selu are low.

On some of the larger islands extensive swamps are found inland, covered with mangroves or low wood. The villages are situated as much as possible on steep rocks and hills near the shore. Timor Laut, Molu, Maru, Vordate, Larat, Selaru, and Seira have a permanent population. All the islands except Molu and Maru lie on one bank, so that, between the islands there are several places where anchorage may be had. The best anchorages are at Ritabel on the west coast of Larat and Adaut on the north coast of Selaru.

For administrative purposes the islands form a division of the Amboina residency under a Civil administrator, and are divided into two sub-divisions. The Larat sub-division comprises the northern part of Timor Laut and the islands Molu, Maru, Vordate, Larat, and the neighbouring smaller islands; Seira sub-division comprises the southern part of Timor Laut, Selaru, Seira, Selu, Wuliaru, and the smaller islands thereabout, including the group which contains Tun and Laibobar. A Posthouder is at the head of the Larat sub-division with head-quarters at Liling Luan (*Lat. 7° 6′ S., Long. 131° 43′ E.*), on Lutur island, and the Seira sub-division is under the Civil administrator at Adaut in Selaru.

The inhabitants, estimated at 25,000 in 1881, are a vigorous race with lank hair, which the men wear artificially coloured red to whitish yellow. The colour of their skin is much lighter than that of the inhabitants of the neighbouring islands. The Papuan type does not appear among them. They are all heathen, without any civilisation,

General charts 942b, 2759a.

savage and touchy, and there is continual enmity between the different villages; women and children, as well as the men, take part in the fighting.

On Timor Laut the natives are cannibals. Strangers are found on Maru island; they are Mohammedans, and are properly clothed.

Although the islands are not fertile, they provide sufficiently for the wants of the inhabitants. Extensive cocoanut plantations line the shores; bananas, papaws, and mangoes are about the only fruits. The people do little in the way of agriculture; rice and sago are cultivated, but they also live on pigs (which are found in great numbers), fish, shell-fish, and turtle.

Makasser praus are almost the only vessels that frequent the islands, but they dare not visit any other places than where the officials reside, and the settlements of Iwar and Watuwahan on Maru island. The articles sought by traders are turtle, trepang, some sorts of wood, and mother-of-pearl shell, the latter of little value. Linen is imported. The natives have still little notion of money; rixdollars and gold coins are received only for making into ornaments; other money is not wanted.

Fresh-water springs are found in many places, but nearly everywhere the water is brackish, and probably from this cause fever is very prevalent.

Selaru, the southernmost of the Tenimber islands, and separated from Timor Laut by Egeron strait, is 27 miles long east-north-east and west-south-west; the southern part of the island is the highest, about 492 feet. There are no remarkable hill-tops, but a long flat ridge, with some solitary trees and extensive grassy plains, are seen. The south point is low, and fronted by a dangerous reef, projecting more than one mile from it, off which the currents are variable and strong at times; the land about the point is covered with trees. The whole island is surrounded by a reef, which extends a mile or more in places, and has from one to 2 feet on it at low water. Reefs extend 2 miles westward from Tanjong Lawador, the northern extreme. Outside the shore reef detached reefs lie here and there, with depths of from 3 to 5 fathoms. The island has 10 villages, of which Adaut, on the north coast, is the principal.

Ariama island (*Lat. 8° 19′ S., Long. 130° 43′ E.*), 148 feet high, and wooded, is about 2 miles long north-north-east and south-south-west and 8 cables wide. It is charted about 3 miles westward of the south-west point of Selaru, but the distance is stated to be 6 miles. The island is surrounded by a reef, and between it and Selaru there is no safe passage; the channel appears to be closed by reefs.

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

Myrmidon bank, with 9 fathoms over it, and deep water around at a distance of 7 cables, lies about 6 miles S.W. ½ W. from Ariama island, but its position has not been accurately determined; a depth of 16 fathoms, sand and coral, was obtained about 4 miles southward of this bank.

Reefs.—At the distance of 5 miles N. ¼ W. from the west point of Selaru there is a reef with probably 7 fathoms water over it, from which the north extreme of that island bears E. ¼ N.

In May, 1902, the s.s. *Generaal Pel* reported the existence of a reef situated with the western point of Selaru bearing S. 18° W., and the northern extreme of the same island S. 84° E.

Heavy breakers were seen off Tanjong Wadatutu in 1887; the chart shows a reef about 3 miles west-south-westward of the point and about 1½ miles off-shore.

Plan of Warain road on 3440.

Anchorages.—There is anchorage on the west coast of Selaru, near the south-west point, at about 1½ miles north-north-west of Warain village (*Lat. 8° 18′ S., Long. 130° 49′ E.*), in from 11 to 13 fathoms, with a rock, covered with vegetation, situated on the shore reef, bearing S. 25° E.; this position is about 7 cables from the nearest land and 2 cables outside the reef. Westward of the anchorage are some detached reefs, the northern of which is a long narrow ridge with 2½ fathoms least water. Half a mile southward of the south end of this ridge is a patch of 3 fathoms, and farther southward are two patches of 5 fathoms.

The village lies in a small bay, in which the depth is not more than 2 feet at low water. The shores of the bay are covered with cocoanut trees.

Chart 942b, Eastern archipelago, eastern portion.

Southward of the north point of Selaru the coast forms a bay, in which Namatawun village is situated; the village is not visible from the sea, the only mark being a small hill, seen above the low land. In front of the village a bank extends far out, so that when anchored in 10 fathoms the village was 7 cables distant.

The Netherlands war-vessel *Java* anchored in 10 fathoms off Namatawun with the north point of Selaru bearing N. 71° E. and nearly in line with the south point of Anger Masa, and the cocoanut trees near the village, S. 5° W.

Plan of Egeron strait on 2465.

Adaut road.—On the north side of Selaru a bay, 2 miles wide, extends 4 miles south-south-westward from Egeron strait, with

Plan of Egeron strait on 2465.

general depths of from 8 to 11 fathoms, decreasing to 5 fathoms at the head, and with no dangers outside the shore reef.

The limits of Adaut road are the eastern shore of the bay, a line drawn S. 50° E. from the north-east point of Nojanak island, and the meridian of that point.

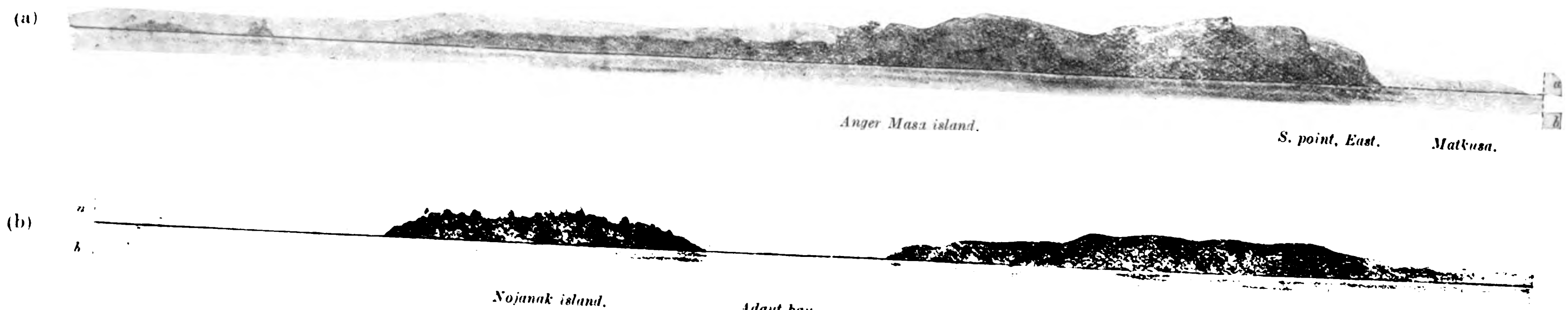
Adaut village lies on the eastern side of the bay near the entrance. The shore reef extends nearly a quarter of a mile from the eastern entrance point, and is marked at its edge by a ball beacon, as charted. There is a stone pier at Adaut, with a shed for goods on its west end; at about 35 yards from the pier-head the depth is 5 fathoms.

There is anchorage anywhere off the village; a good berth is in 9 fathoms, sand, with the flagstaff in front of the house of the Civil administrator bearing S. 69° E. and the east point of Anger Masa N. 4° W.

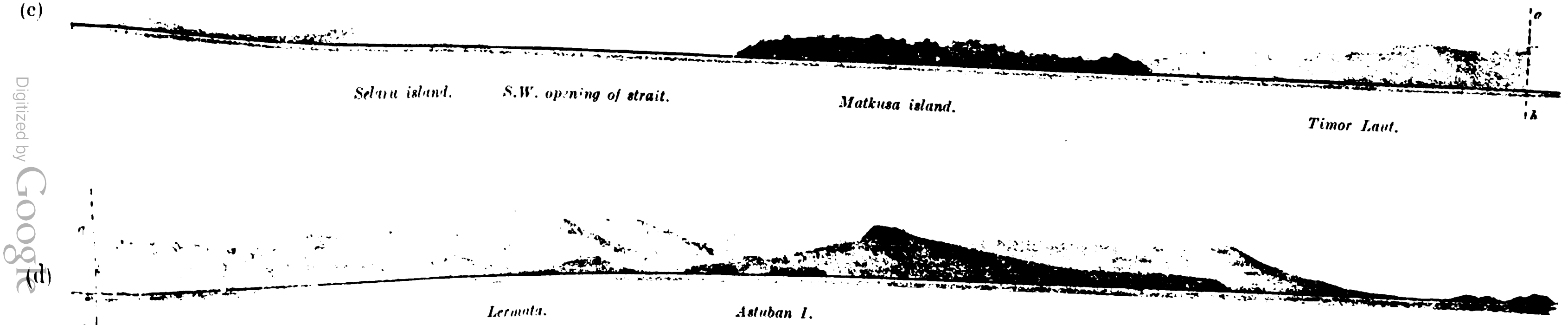
Communication.—Adaut (*Lat. 8° 8′ S., Long. 131° 7′ E.*) is visited once a month by the vessel of the Royal Netherlands Steam Packet Company employed on the route from Amboina to the Kei and Aru islands and Merauke; one month on the outward voyage to Merauke and the alternate month on the homeward voyage from that place.

Egeron strait, separating Selaru from the moderately high south coast of Timor Laut, is about 11 miles in length and 6 miles wide, but several islands surrounded by reefs, which lie in the entrances, narrow the channels to little more than one mile in width; the channels, however, present no difficulty to a vessel carefully navigated, and carry depths of from 9 to 15 fathoms. Anger Masa, a moderately high island lying in the western entrance, may be passed on either side, and there is a good channel between Nojanak island and Batu Bual, a rock under the shore of Selaru. In the eastern part of the strait is Matkusa island, and northward of it Nusa Tabor and Tikus islets lying on the same reef. Tikus is merely a pile of rocks. All these islands are surrounded by reefs, which extend over a mile westward and from a half to three-quarters of a mile eastward of Anger Masa, half a mile northward and one mile south-eastward of Nojanak, and over half a mile eastward and a little less westward of Matkusa.

There appears to be good and secure anchorage on both sides of Egeron strait, in bays somewhat similar in form, and 2 miles wide, that penetrate the land to the distance of about 4 miles. The anchorage in Timor Laut is off the village of Laktanae, in a depth of 8 to 15 fathoms; its approach lies westward of the island of Astuban, from which reefs extend to a distance of from a quarter to half a mile. A vessel has also anchored in 17 fathoms off Lermata village


(a)
Anger Masa island.
S. point, East.
Matkusa.
(b)
a
b
Nojanak island.
Adaut bay.
Selaru island.

Entrance to Egeron strait from the west (2 views).



Entrance to Egeron strait from the north-east (2 views).

Plan of Egeron strait on 2465. Var. 3° E.

on the western entrance point of the bay. This village is built on a rocky plateau, with steep sides, and inaccessible from the sea; it may be recognised from seaward by trees with yellow leaves.

The anchorage on the Selaru side is described on page 234.

See views of entrances to Egeron strait at page 234.

Chart 942b, Eastern archipelago, eastern portion.

Timor Laut or Yamdena is 65 miles long, north-north-east and south-south-west and about 23 miles wide in the middle. The west coast is low and fronted by islets and reefs only partially explored. The east coast is formed by a range of densely-wooded hills 600 to 800 feet high; the south-east coast is the highest. It is indented by several bays, and a reef fringes the whole coast, which should not be approached at night. The villages are built on the cliffs overhanging the sea, and are most difficult to approach. During the south-east monsoon a strong current sets along the east side of the island, but its direction is not stated.

Plan of anchorage of Oliliet on 1460.

Oliliet (*Lat. 8° 1′ S., Long. 131° 19′ E.*), one of these villages built on a cliff 413 feet high, about 5 miles from the south-east point of Timor Laut, was visited in 1839 by Captain Owen Stanley in H.M.S. *Britomart*. The cliff is nearly perpendicular, and can only be ascended from seaward by a flight of steps cut in the hill-side. *See* view on plan 1460.

Anchorage can be had during the north-west monsoon in a depth of 6 to 11 fathoms at from 1½ to 2 cables south of the point on which the village stands, but it is quite exposed to the east; also in from 14 to 25 fathoms with the flagstaff bearing about N.W. The shore reef southward of the anchorage extends off about 6 cables: on it are some rocks above water.

Pigs and poultry appeared plentiful at the time of the *Britomart's* visit, the natives, however, were not very willing to part with their stock. Water could be procured on the beach, but a merchant vessel should be cautious in sending her boats for it, as the natives have a reputation for treachery.

Laurang bay, about 2½ miles northward of Oliliet, affords good anchorage in 14 or 15 fathoms during the north-west monsoon. Laurang village is built in a similar manner to Oliliet.

Plan of Mitak bay on 3440.

Mitak bay, 6 miles northward of Oliliet, affords good and safe anchorage, sheltered from all winds except those from about east. The general depths are from 6 to 10 fathoms.

General charts 942b, 2759a.

Plan of Mitak bay on 3440. Var. 3° E.

The south side of the bay is formed by a narrow tongue of high land ending in Tanjong Nuan Tutul; close eastward of this point is Nuan island, rocky, wooded, and 98 feet high, which, from the southward, forms a good mark for the bay. On the north side, Mount Amtufu, lying about half a mile from the sea, also forms a mark from the southward, and on this side, on the hilly ground, lie the villages Mitak Wowoda and Mitak Kewarat; the latter is not visible from the bay, and both are reached by footpaths. A conspicuous white spot is situated about 3 cables westward of Mitak Kewarat.

Sungi Weri Onileh, a small stream, flows into the northern part of the bay; here is a good landing place for boats. The mouth of the stream is difficult to make out, but the cocoanut trees that extend along the whole western shore of the bay, end here, thereby indicating the position.

The shores of the bay are bordered in places by reefs, dry for a great part at low water, and which extend half a mile southward of the north entrance point. The south-western part of the bay is entirely sand, with a sand-beach, which is also found on the north side, where the sungi discharges. Just outside, in the middle of the entrance, is a shoal of stones, with 7 fathoms on it, and half a mile from the west shore of the bay is a reef with 1¼ fathoms least water.

Directions.—From the southward the entrance to the bay is indicated by Nuan island and Mount Amtufu. Steer northward until the bay opens, and bring a conspicuous yellow tree on the slope of a hill on the west side of the bay to bear N. 78° W., when steer for it until the east end of Nuan island bears S. 52° E.; then steer N. 52° W., with the east end of the island astern, and when a round tree comes in line with Tanjong Donkere, a dark point covered with mangroves, bearing S. 62° W., anchor in 8 fathoms, mud and sand, a quarter of a mile from the reef, or as convenient. Nuan island may be approached closer, as it is steep-to, but the north side of the entrance should be avoided. Anchorage may be had in the south-west part of the bay, in 5 fathoms, by following the last mark given, which leads south-eastward of the 1¼-fathoms detached reef.

From the northward the bay is not easy to recognise, as Mount Amtufu is hidden and Nuan island is difficult to make out; the hills on the tongue of land by Tanjong Nuan Tutul, however, appear as a single flat hill. When the conspicuous yellow tree is seen proceed as before directed.

The bay can be approached at night.

Chart 942b, Eastern archipelago, eastern portion.

Amtufu road (*Lat. 7° 52′ S., Long. 131° 23′ E.*).—Amtufu of the chart comprises four villages. Near the southern one a narrow reef extends south-eastward, which partly dries, with projecting rocks. Abreast the northern village the shore reef extends a considerable distance off, with two islets on it. South-westward of the islets, at about 1¾ cables within the 5-fathoms line, and 1¾ miles eastward of Amtufu is a shoal of 6 feet. In the bay between these reefs there is very good anchorage except in the south-east monsoon. The depths decrease gradually from 14 to 6 and 4 fathoms at from 3 to 2 cables from the shore reef. Entering from the northward the outer islet should be rounded at a distance equal to its apparent length. North-north-eastward of the outer islet there is anchorage in 11 fathoms.

Coast.—About 7½ miles northward of Amtufu, anchorage was found off Sangliet village, in 13 fathoms, and about 8 miles farther north off Alusi, in 11 fathoms. The shore reef is visible from discoloration. In steaming along this coast no detached dangers were seen, but it is possible that between Alusi and Majana some reefs may lie farther out from the shore, as in 1885 discoloured water was seen on two occasions between Merapi reef and the shore. Tanjong Majano has detached rocks off it. The second bay northward of Tanjong Majano is named Limbua Simpuan, and lies between two steep points, the northern of which is the higher; in the bay there is anchorage in 9 fathoms. West-north-west of the bay, in which is a village of the same name, is a round-topped wooded hill, showing above the coast range; it is conspicuous, and useful when approaching this coast. Tanjong Arkilo, about 3 miles southward of Tanjong Saluasa, is better recognised than the latter, which is less pointed than the chart shows.

Merapi reef, lying about 7 miles off the east coast of Timor Laut, is 3 miles long north-east and south-west, and about one mile wide; some rocks on the eastern part and on the south point a large white sandbank, dry at low water. From its northern end Tanjong Saluasa bears N. by W. distant 14 miles. Merapi reef is lower than Garnusa reef, but is sometimes seen well against the horizon.

Reef.—A reef with 7 feet least water lies between Merapi and Garnusa reefs, with Tanjong Majano bearing S. 71° W., distant 5¾ miles. The channel between Merapi and Garnusa reefs is unsafe, depths of less than 5 fathoms having been found in it.

Garnusa reef lies 5 miles northward of Merapi reef, and is about 2 miles in diameter; it consists of a sandbank covered at high water, and may be passed on the north side easily by the eye.

Shoals off Tanjong Saluasa (*Lat. 7°24′S., Long. 131°42′E.*).—Two sand shoals, dry at low water, lie off the east coast of Timor Laut, at about 5½ miles E. by S. ½ S. from Saluasa point, as charted. Each of the above shoals, which are about 5 cables apart in a north-east and south-west direction, is about 7 cables in length. P.D. has been placed against them on the chart.

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

Discoloured water was observed between them and the coast.

A shoal about 5½ cables in diameter, which dries at low water, lies off the east coast of Timor Laut, about 6 miles N. 54° E. from Tanjong Saluasa.

An islet surrounded by a large reef lies about 3 miles north-westward of Tanjong Saluasa. This part of the coast is little known.

Larat island is higher and has a more even surface than Vordate to the northward; it is separated from the north-east end of Timor Laut by the narrow Wallace channel, which has a depth of 6 feet at low water, and is only fit for boats. The island is 15 miles in length east-south-east and west-north-west, its eastern half and also the north-west side being bordered by reef extending nearly one mile out in places. There are six villages, with a population of about 2,000. View *a*, at page 240.

The wreck of the s.s. *Tambora* lies southward of the south-east point of Larat, and appears like a vessel at anchor.

Anchorages.—There is anchorage off West Lamdesar village on the south coast, between the shore reef and two drying reefs situated 1¼ miles from the shore, and about half a mile southward of a rocky islet on the edge of the shore reef south-westward of the village. No depth is given.

Off Keliobar village, on the north coast, about 6 miles from the west point, there is anchorage in about 23 fathoms; the 5-fathoms line here lies more than half a mile from the shore, and inside it are numerous rocks.

For Ritabel bay (*Lat. 7° 6′ S., Long. 131° 43′ E.*), *see* below.

Plan of Ritabel bay, &c., on 2465.

Approach to Ritabel bay.—Islets and dangers.—Batu Kapal, lying near the north coast of Larat, about 2½ miles eastward of the entrance to Ritabel bay, is a rock, which at some distance much resembles a large prau without masts. It forms a good mark.

A shoal over half a mile in length east and west within the 5-fathoms limit, with a least depth of 2½ fathoms at the western end, lies with the shoal spot N. 86° W., 1$\frac{8}{10}$ miles from Batu Kapal and 9 cables off-shore.

A reef with 2 fathoms on it lies 7 cables S.W. ¾ W. from the shoal just mentioned, and about the same distance off-shore; it lies northward of the entrance to the bay.

Barnusa is a low densely-wooded island about one mile long north and south, situated about 4½ miles north-westward of the entrance to Ritabel bay, and nearly 1½ miles from the north point of Timor Laut. It is surrounded by a reef about 3 cables wide, from which, on the north-east side, a ridge of coral extends north-eastward fully one mile, with depths of from 6 to 8 fathoms.

General charts 942b, 2759a.

Plan of Ritabel bay, &c., on 2465. Var. 3° E.

Between Barnusa and the entrance to Ritabel bay is an extensive shoal, marked by breakers and discoloured water, and showing sandbanks above water in some places; it is separated from Timor Laut by a narrow channel. View *b*, at page 240.

Ritabel bay (*Lat. 7° 6′ S., Long. 131° 43′ E.*), at the northern end of Wallace channel, is about 1¼ miles long, north and south, and 2½ to 4 cables wide, between Larat on the east and the low island of Lutur on the west. On the east side of Lutur is Liling Luan village. The channel between Lutur and Timor Laut dries at low water, and is covered with mangroves in many places. The bay affords good and well-sheltered though limited anchorage between the villages of Ritabel on the Larat shore, and Liling Luan, in a depth of from 7 to 10 fathoms, mud. On the eastern side of the entrance a reef extends 6 cables north-westward from the village of Watidal, on the Larat shore. Just northward of Ritabel a reef extends out nearly 1½ cables, the outer point of which is marked by a ball beacon. Close off the north-east point of Lutur is the rocky wooded islet of Watmomal, and from the same point a reef extends northward for about one mile, with a depth of one fathom on its edge and steep-to, forming the west side of the channel; this reef is generally marked by a ball beacon, which stands a little westward of the edge, and must not be closely approached. Northward of Ritabel lie the villages of Ridul and Watidal, the last on a hill.

A Posthouder resides at Liling Luan.

Directions.—Approaching from the north-west, steer towards Batu Kapal rock, on a S. 64° E. bearing, until the inner point of Ritabel bears S. 2° E.

To enter Ritabel bay steer in with Ritabel point bearing S. 2° E., which leads between the 2-fathoms patch and the western reefs, and continue on this mark, taking care not to approach the reef northward of Lutur closely; avoid the reef marked by a beacon off Ritabel, and anchor between that village and Liling Luan. The reefs are strongly discoloured.

Communication.—Ritabel bay (Liling Luan) is visited once a month by the vessel of the Royal Netherlands Steam Packet Company, in the same manner as Adaut. *See* page 234.

Chart 942b, Eastern archipelago, eastern portion.

Vordate island, separated from Larat by a channel one mile wide, is 7 miles in length north-east and south-west. Like Larat, it is moderately high, and well wooded, but the hills are more distinct. The coasts are low, but it is high in the middle, and has a fertile appearance. The shores are bordered in parts with reefs. From the north point of the island a reef extends one mile off, with a round bare rock at the end, which can only be made out at a short distance.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

Vessels should not pass this point nearer than 2 miles. Off Aweer on the south-west side of the island the shore reef extends off 1½ miles, and cannot be crossed by boats at low water. View *c*, at page 240.

The population, estimated at about 1,700, is divided among six villages, three on the west coast and three in the southern part of the island.

The channel between Vordate and Larat has a navigable width of about a quarter of a mile between reefs extending a quarter of a mile from the south coast of Vordate and fully half a mile from Larat. It is clear and deep, and the reefs on either side are easily distinguished.

Schildpad islet lies 2½ miles south-eastward of the middle of Vordate at the south-western end of a reef 3 miles in length. View *c*, at page 244.

Plan of Sabiani anchorage on 2465.

Anchorage (*Lat. 6° 58′ S., Long. 131° 55′ E.*).—There is anchorage in the south-east monsoon off the north-west side of Vordate, in a depth of 20 fathoms, sand and stones, about 3 cables west-south-west of the point at Sabiani village, and about one cable off-shore. Inside of 12 fathoms the depth decreases suddenly, and the bottom is stony. The bank is very steep, so that it is advisable to run out a hawser to the shore, protecting it from chafing against the rocky ground. At from 2 to 3 cables from the shore the water is deep and the holding ground bad. Boats can get close to the shore at low water, and in the south-east monsoon there are no breakers.

Supplies.—At Sabiani water can be obtained from a brook. Pigs, poultry, and some other supplies may be had.

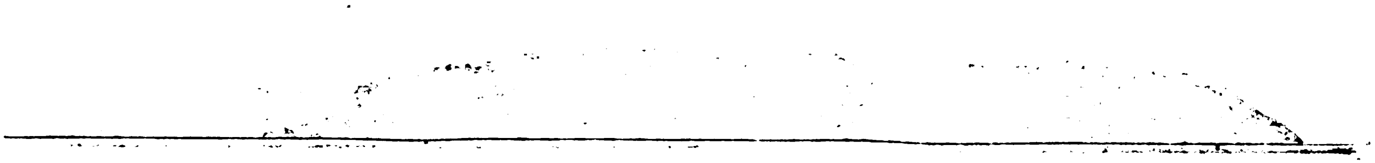
Chart 942b, Eastern archipelago, eastern portion.

West coast of Timor Laut or Yamdena.—The west coast of Timor Laut appears to be little known; the only information available relates to Salwasa bay, where there is anchorage.

Salwasa bay is a narrow inlet penetrating 5 or 6 miles eastward, abreast Seira island. The Salwasa river enters the head of the bay; from the quantity of mud brought down by this and other streams, the bay is very shoal, and a channel is left only in the middle. The mudbanks along the shores dry to a considerable distance off. On the south side are two villages, Salwasa Otimmer and Salwasa Wermatong, both very conspicuous, being built on hills rising steeply from the bay to a height of from 200 to 300 feet. The villages are surrounded by walls surmounted by a palisade. The first-named village is the larger of the two.

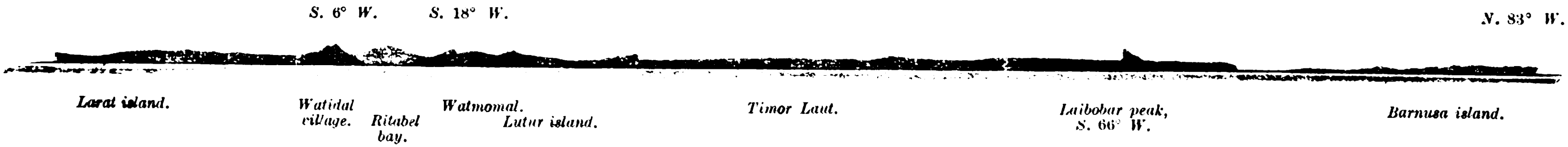
The depth on the bar is 1¾ fathoms, and there are from 5 to 6 fathoms in the channel inside; above the villages it becomes shoaler,

(a)



Larat island from the northward.

(b)

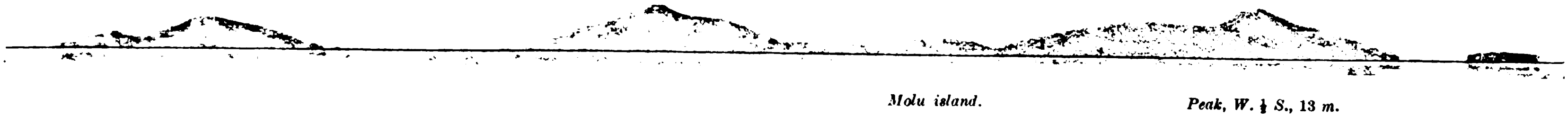

S. 6° W.
S. 18° W.
N. 83° W.
Larat island.
Watidal village.
Ritabel bay.
Watmomal.
Lutur island.
Timor Laut.
Laibobar peak, S. 66° W.
Barnusa island.

Approach to Ritabel bay from the northward.

(c)

Vordate island from the north-north-west.

(d)


Molu island.
Peak, W. ½ S., 13 m.

Islands north of Timor Laut.

with not less than 10 feet, but is deeper again near the head of the bay.

There is safe anchorage in both monsoons off these villages for vessels that can enter the bay (*Lat. 7° 42′ S., Long. 131° 10′ E.*).

Westward of the bay is the entrance to a narrow, tortuous channel between Seira and Timor Laut, much used by praus in the south-east monsoon; an islet lies in the entrance.

Directions.—From the northward by Yamdena strait the bay is seen open when near Wolas island, but it cannot be steered for directly, as a bank of sand and mud projects westward from Timor Laut, with its point beyond the low north-east extreme of Seira. The edge of this bank may be followed by the lead until a channel with from 10 to 12 fathoms is found on the north side of Seira, leading eastward on the south side of the bank, and giving access to the bay. Eastward of the north-east point of Seira the channel divides into two branches, one running close under Seira and ending in a mudbank, and the other leading to the bar; the latter must be followed on a S. by E. course, steering for the east side of a conspicuous white rocky point. The west side of this channel is steep-to, but the east side may be easily followed by the lead, which should be kept going. When the western entrance point bears W. by S. ½ S., the bar begins with the depth before mentioned, after passing which the channel becomes narrower, and takes a south-east direction straight for the hill on which Salwasa Wermatong is situated.

Approaching from the westward the north coast of Seira should not be closely approached, as the shore reef extends some way off, and is steep-to and partly dry at low water.

Tide.—The range of tide observed was from 3 to 4 feet; the tidal streams set in the direction of the channel.

Islands and dangers off the west coast of Timor Laut.*—**Seira,**

the southernmost of the chain of islands off the west coast of Timor Laut, is about 12 miles in length east and west and about 8 miles broad at the eastern end, whence it narrows to the west point. It is moderately high on the east side; the south side is lower. The island is inhabited, the villages lying along the north and west coasts. Reefs extend off the north and west coasts and for 4 miles off the south-west point, with several islets and rocks on them; among these Sekelur lies northward and Jejaru north-westward of the west point, Ngolin and Watuwawan off the south-west point. There is anchorage off Wailutu village on the north coast; *see* next page.

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* The charts of this region must be followed with caution, as the Dutch publication, on which the Admiralty chart is based, differs considerably from others of the same neighbourhood.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

Dangers.—Discoloured water.—In 1889 the commander of H.N.M.S. *Madura* reported the existence of discoloured water with an estimated depth of 7 to 8 fathoms in lat. 7° 59′ S., long. 130° 43½′ E., or about 23 miles westward of the south end of Timor Laut.

Discoloured water, which appeared to indicate a reef with not more than 3 fathoms over it, was reported in 1911 by the commander of H.N.M.S. *Tromp*, in lat. 7° 8′ S., long. 130° 37′ E., westward of the Tenimber islands.

Bara Sadi reef, partly dry at low water, and with 5 feet on it at high water, lies about 12 miles S. 50° W. from the west point of Seira island. At about 3 miles southward of this reef depths of 7½ to 10 fathoms were obtained.

A reef with 5 fathoms least water and 7 cables in extent lies about 8 miles S. 75° E. from Bara Sadi reef, and about 5 miles south of the west side of Ngolin.

A reef with 4 fathoms over it was reported by the *Watergeus* in 1881, in a position from which the south-west point of Selu bore N. 31° W. and the north point of Sekelur N. 73° E.; and the *Arend*, in 1906, reported the same depth in about the same position.

Plan of Wailutu road on 2465.

Wailutu road (*Lat. 7° 40′ S., Long. 131° 1′ E.*), off the village of that name on the north side of Seira island, is formed by a bight in the shore reef, and affords anchorage in 17 fathoms at about a quarter of a mile from the shore, with a conspicuous tree bearing S. by E. ½ E. The bay may be recognised by a patch of white sand beach; the reefs can all be distinguished by discoloration. The inhabitants of the village are like those of Larat, but appear more peaceable, and are employed in collecting trepang. Buginese from Makassar come here to barter haberdashery and linen for trepang. Fuel, water, and provisions are not to be had, excepting pigs, which are dear. The houses are partly hidden by trees.

Directions.—From the westward, steer eastward passing not less than 3 cables northward of Sekelur until a conspicuous tree showing above the cocoanut trees near the village bears S. by E. ½ E., when steer for it and anchor as above directed. Great care is required when approaching the anchorage, as the shore reef immediately westward of it extends out to a distance of one mile.

When proceeding from Wailutu to Egeron strait, steer to the westward after clearing the shore reef, passing not less than 3 cables north of Sekelur, and continue on until Jejaru islet on the Seira reef and surrounded by a dry sandbank is well within the west point of Seira, when alter course to S. 6° E., bearing in mind the Watergeus reef of 4 fathoms. Reefs extend 2 miles south-westward of Ngolin, which islet should not be approached within 4 miles. Ngolin being passed, Egeron strait may be steered for, avoiding the 5-fathoms reef southward of the former, previously mentioned. From Wailutu to Ritabel, *see* Yamdena strait below.

Chart 942b, Eastern archipelago, eastern portion.

Selu island has two hills about 690 feet high; the south side is bordered by a reef, as charted, and two islets on a reef lie off its north-west point, but little is known of this and the other islands of the chain. Selu and the islands to the northward, off the west coast of Timor Laut, have no permanent population.

Wuliaru, eastward of Selu, has a small bank of 4¾ fathoms least water on its east side. Nujanatrool islet lies close off the north-east end of Wuliaru. Views *a* and *b*, at page 244.

Kesiwu island and Wolas islet, close eastward of it, lie between the south part of Wuliaru and Timor Laut. A reef, dry at low water, lies about 1½ miles southward of the south point of Wuliaru, and another reef awash at low water lies about 3 miles south-eastward of Kesiwu.

Wotar island lies north-eastward of Nujanatrool, and between them are two rocks high above the water.

Laibobar (*Lat. 7° 10′ S., Long. 131° 25′ E.*), north-eastward of Wotar, rises to a peak 787 feet high, and is a good mark; on the east side are two small islets, from which a reef extends a short distance, and the chart shows a group of islets southward and one islet south-westward of Laibobar. The channel between Laibobar and Wotar was passed through in 1903 by the *Ceram*, in mid-channel; the weather was favourable, and no discoloured water was seen and no bottom obtained at a depth of 10 fathoms.

Neman island, northward of Laibobar, has a sandbank extending from its south point, with three rocks on it, one of which is conical in shape. Two islets lie off the north-east point. Neman and Tun, charted to the northward, are said to appear as one island when approaching from the eastward. There is discoloured water about 2 miles north-eastward of Tun island.

Kabawa islet lies eastward of Neman, and farther eastward is Karata islet, which lies north-north-east from the north-west point of Timor Laut, and is very conspicuous from its rounded shape.

Yamdena strait.—Directions.—Yamdena strait, the channel between the west coast of Timor Laut and the islands to the westward, offers the shortest route for vessels passing between Wailutu and Ritabel. On leaving Wailutu steer N. 20° E. until well clear of the shore reef eastward of the anchorage, when alter course to N. 57° E., passing southward of the reef off the south end of Wuliaru and between Kesiwu island and the reef 3 miles south-east of it. The lead should be kept going, and the vessel should not come into less

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

than 8 fathoms; the water is generally too muddy for the reefs to be seen. Pass eastward of Kesiwu and Wolas; the shoal off Nus Taram, three islets on the Timor Laut shore about 6 miles north-east of Wolas, should not be approached to less than 6 fathoms; Laibobar peak is a good mark here. Farther northward the shore reef is not more than 3 cables wide, and can generally be seen. Vessels pass between the north-west point of Timor Laut and Karata islet north-north-east of it, but the point of Timor Laut must be given a good berth, as the drying edge of the shore reef extends about one mile off it. The passage between Karata and Kabawa islet to the westward is not safe, but the passage between Kabawa and Neman island may be taken. From either of the above two passages steer to the north-eastward to pass southward of Virinun and northward of Barnusa island, and then follow the directions for Ritabel bay on page 239.

Islands north of Timor Laut.—Molu island (*Lat. 6° 45' S., Long. 131° 33' E.*), the northern island of the Tenimber group, is about 7½ miles in length north and south, and of moderate height, being visible from 20 to 24 miles off. It has two hills, one in the north and the other in the south part. Around the coast are five villages. Close northward of Molu lies Kalboor, an oblong wooded islet, with a flat surface and a sand-beach in one part. Warena islet lies off the east coast. Wajangan island lies close southward of Molu; from its south end a ridge with 8 fathoms on it extends 2 miles eastward. View *d*, at page 240.

Anchorages.—There is anchorage off the village of Adodo near the north-west point of Molu in 17 fathoms outside the reefs, which extend along the whole coast. There is an opening in the reefs here leading to the shore in which a good berth was found, with from 8 to 13 fathoms of water.

Anchorage was found in 10 fathoms off Bowawan village on the west side of the south point of Molu. The anchorage was approached on a S. 70° E. course for the south point of the island, and very irregular depths were found; one sounding was 3½ fathoms; great caution is recommended here. At the anchorage the stern of the ship was in 20 fathoms.

Reef.—A reef on which breakers were seen is charted about 3 miles westward of the south point of Molu; it is said that detached dangers exist between the reef and the point.

Maru island, about 3 miles south-south-west of Molu, has a dome-shaped hill near the south point, but elsewhere is rather low. There are five villages on the island, two of which, Iwar and Watuwahan on the south coast, are for a great part inhabited by strangers. A reef, marked by discoloured water and breakers, extends about one mile from the south-west point.

General chart 2759a.

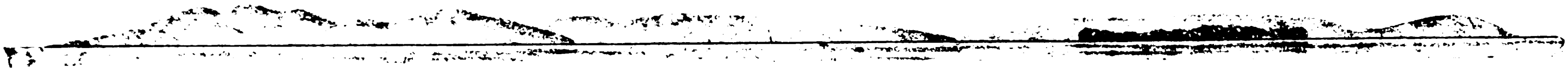
[To face page 244.]

(a)

N.E. ½ N.
Nitu island.
N.E. ½ E.
Selu island.
E. ½ N.

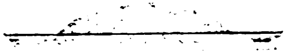
Selu and Nitu islands.

(b)


Wuliaru.
N. by W.
Selu.
Sekelur, N.N.E. ½ E.

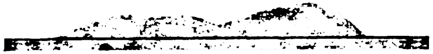
Selu and Sekelur islands. Wuliaru, behind Sekelur, touching Selu.

(c)



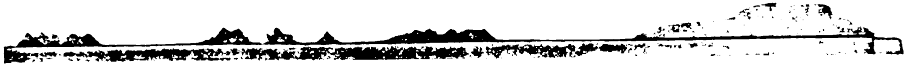
Schildpad I. N. 80° E. 7 m.

(d)



Baba I. (Aiu or Yowl islands)
N.E. 15 m.

(e)


Wiang (Wajak), W.N.W.
Uranie, N.N.W.

Wiang islands, north-west of Waigiu.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

Discoloured water, presumably a reef, was reported in 1903 about 4 miles westward of Maru island.

The channel between Wajangan and Maru is safe to navigate. The reef of Wajangan should not be approached within a depth of 7 fathoms. The reef of Maru extends 1½ miles from the north side, and generally shows well.

A group of islets and reefs named Nus Lima (*Lat. 6° 58′ S., Long. 131° 35′ E.*) lies about 4½ miles south-eastward of Maru, and cover an extent of about 5 miles in a north-north-east and opposite direction. From Virinun the south islet reefs extend south-westward one mile. Barnusa island is described on page 238.

General chart 2759a.

CHAPTER V.

ISLANDS OFF THE NORTH-WEST PENINSULA OF NEW GUINEA.—NORTH, WEST, AND SOUTH-WEST COASTS OF NEW GUINEA.—ARAFURA SEA.

VARIATION IN 1911.

Increasing 1½ minutes annually.

Chart 2759a, Australia, northern portion.

NEW GUINEA.—A general description of New Guinea is given in Chapter I. The western part, which alone is described in this chapter is Dutch territory, and is divided into three districts for administrative purposes. The south coast eastward from Cape Steenboom forms the independent Assistant residency of South New Guinea, with the seat of government at Merauke; the two other divisions, West and North New Guinea, belong to the residency of Ternate, and are each under an Assistant resident, with head-quarters at Fak Fak (*Lat. 2° 55′ S., Long. 132° 16′ E.*), and Manokwari, in Dorei harbour, respectively, the latter place and Merauke being beyond the scope of this work.

Strangers are settled here and there on the coast. On the islands off the west and north-west coasts a mingling with the natives of Ceram, Tidore, Makassar, and other parts has taken place. The coast natives of West New Guinea are mostly subject to the smaller islands in their neighbourhood, and with these acknowledge, but generally only in name, the supreme authority of the Sultan of Tidore.

The western part of New Guinea is subject to earthquakes, and in the spring of 1864 a violent volcanic eruption occurred in the Arfak mountains.

Several large rivers flow into the sea on the south and west coasts.

Among the principal products are copra, nutmegs, dammar, birds' skins, sharks' fins, trepang, turtle, and shells, which are bartered for silk, linen, beads, and toys.

The north-western and western coasts of New Guinea are comparatively little known, being out of the ordinary track of ships, and seldom visited by European vessels for trade.

Winds and weather.—On the West coast of New Guinea, the south-east monsoon lasts from April to October, and the north-west monsoon for the remainder of the year, with sometimes variable winds

General chart 2759a.

Chart 2759a, Australia, northern portion.

between N.N.W. and N.E. in January. In the spring the weather is often changeable; in March, April, and May, storms and squalls are experienced, and heavy rains from June to September. From October to May the weather is serene and fine.

Chart 781, Pacific ocean.

ISLANDS NORTH of NEW GUINEA.—Lord North island, Helen and Carteret reefs, as well as the other islands between New Guinea and the Pelew islands are described in Pacific islands, Vol. I. (Western groups).

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Asia islands (*Lat. 1° 3′ N., Long. 131° 17′ E.*) are three low, flat islets connected with each other by reefs and occupying a space 5 miles in length north-east and south-west. A reef extends from one to 2 miles north-east from the northern islet, and from the western side of all the islands.

Aiu or **Yowl islands,** lying north of Waigiu, consist of about 20 small islands surrounded by reefs, covering on the chart an extent of 25 miles north-north-east and south-south-west, by 13 miles across. The southern and central islands were visited by Captain Forrest in 1775, and were described by him as being five in number. The largest of them, Baba, is 2½ miles long, 492 feet high, and is inhabited; its reef extends one mile to the southward, and is steep-to. The south-eastern islands, the principal of which are Sebemuki and Kapamuki, should not be approached, it is said, within 8 miles on the south and east sides. Abdon lies in about the centre of the reef, and is about 197 feet high. Small vessels may approach the east side of Abdon, where the depth is from 5 to 19 fathoms, through a channel which passes about 2 miles westward of the north-western islets. The northern islands are laid down by Captain Forrest from native accounts; they are reported to be low and wooded with cocoanut trees. The principal islets among them are Konibar and Wirisoi; Konibar is nearly as high as Abdon. Some of the islands besides Baba are inhabited. There are fish and poultry in abundance, besides some fruit. The natives go occasionally to Waigiu to barter sago and other articles against shells, birds' nests, &c. View *d*, of Baba island at page 244.

The Aiu or Yowl islands are reported to lie about 4 miles farther west than charted.

The channel between these islands and the Asia islets has been traversed by many vessels; no dangers have been discovered in it.

Budd islet, first seen by D'Urville in 1828, is low and wooded; it is placed on the chart 17 miles N. 71° W. of Baba island.

General chart 1263.

Plan of Pulo Saiang on 912. Var. 2° 30′ E.

ISLANDS N.W. of NEW GUINEA.—Pulo Saiang, the outermost island of the north entrance to Gillolo passage, and about 24 miles north-east of Iyoi, is a low flat island about 3½ miles long north and south, and from 1½ to 3 miles wide. The bottom can be seen clearly at a mile from the south-east point. There are depths of 10 to 20 fathoms at a distance of 3 or 4 miles from the west side of the island, decreasing towards the shore. Water can be obtained from a rocky point near the north-west point of the island, where a reef projects about a mile. Turtle frequent the island. Eye (Ai) islet, off the north end of Saiang, is small and wooded, with the depth of 7 fathoms at the distance of a mile to the westward; breakers have been reported to extend one mile north-westward and reefs more than one mile northward of Eye islet.

Hunter bank, having 10 fathoms over it, is situated 8 miles to the eastward of Saiang, in lat. 0° 20′ N., long. 129° 58½′ E.

Chart 942b, Eastern archipelago, eastern portion.

Wiang island (Wajak), about 13 miles south-east of Saiang, is the north-westernmost of a group named Wiang islands, extending off the north-west end of Waigiu. The next two are Stephanie and Kwoi, and the two easternmost are Coquille and Uranie; they are all high. View *e*, at page 244.

Ruib is the largest and highest island north-west of Waigiu, and has an elevation of 2,264 feet. Balabalak island lies close westward of Ruib, and north, east, and south of Ruib lie several islets and rocks which contract the passage between it and Waigiu, called Bougainville strait.

Uranie passage.—It is not advisable to use Uranie passage between the Wiang islands and Ruib; the French corvette *Uranie* found a coral bank of 5¼ fathoms 6 miles N.W. by N. from the north end of Ruib.

BOUGAINVILLE STRAIT (*Lat. 0°10′S., Long. 130°10′E.*). —This strait, between Ruib island on the north-west, and Dyo and Batang Pele islands, and the north-west coast of Waigiu on the south-east, was first traversed by M. Bougainville, in 1768.

The width of the channel is reduced to about 3 miles by Mee island and the rocky islets lying south-east of Ruib. There is a bank in the south-west entrance of the strait, on which the *Recherche* struck 5 fathoms, but which has not been further examined. There is also a coral bank with a depth of 7 fathoms and probably less water over it, lying to the northward of the 5-fathoms patch, with which it may be connected.; this coral bank (discovered in 1899) lies with the south point of Ruib island bearing N. 47° E., and the west extreme of Balabalak island N. 24° W.

General charts 942b, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

At about 4 miles N.N.W. from Dyo island, in the south-western part of the strait, soundings of 15 fathoms have been obtained, and the discoloured appearance of the water indicated shoal depths between the above position and Dyo (*Lat. 0° 15′ S., Long. 130° 8′ E.*).

The commander of the Netherlands war-vessel *Java* reported, in 1887, that the west point of Mee island should not be approached within 2 miles, for the *Java*, when coming from the northward, passed close westward of a detached reef off it, and afterwards passed on the east side of a larger reef. Neither of these reefs are shown on the chart. No other dangers are known, but the strong tide rips may indicate rocks or other dangers.

Vessels should pass south of the rocky islets off Ruib.

The currents in the strait are reported to be strong, but information is wanting as to the direction in which they set.

WAIGIU ISLAND is 68 miles in length, east and west, with 25 miles greatest width, and is nearly divided into two by an inlet on the south side. The island is hilly and uneven, and, except in the south-western part, has little beach, the hills descending steeply to the sea nearly everywhere. The mountains reach no very great height; the Sugarloaf mountain in the north side, westward of the Waigiu sea, is 3,081 feet high, and the highest peak, Buffaloes Horn, 17 miles farther eastward, has a height of about 3,642 feet, and is very conspicuous, its steep horn-shaped top showing above the surrounding summits. In some directions this mountain has a blunt and round and in other directions a pointed form. The north coast shows hard crystalline rocks, but the south coast is mostly of coral limestone, fissured and worn into many fantastic shapes. The whole island is clothed with dense forest. The climate is hot and moist. The inhabitants on the coast appear to be immigrants from New Guinea, Gillolo, and surrounding islands, mixed in various degrees; those of the interior are Papuans; the number of the inhabitants is unknown. The language spoken is that of the north-west New Guinea. Sago is the chief food, rice is unknown. The principal products are sago, birds' skins, turtle, trepang, and shells. Views at page 252.

The island is under the jurisdiction of the four rajahs of Salwatti, Waigiu, Lilinta, and Waigama (the last two places are in Misol), and is subject to the Sultan of Tidore.

WEST COAST of WAIGIU.—Very little is known of the west coast of Waigiu. In the large bay on the south part of this coast are several islands, on one of which, Mutu besar, is a village. The *Java* anchored off the village in 29 fathoms.

General charts 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Tanjong Sel Pele, the western extreme of Waigiu, has some rocks off it.

Batang Pele, an island lying about 2½ miles southward of Tanjong Sel Pele, has some hills on it, the highest having an elevation of 1,211 feet; the island southward of it is low. Dyo island, situated about 2 miles westward of the south-west end of Batang Pele, is flat and only 167 feet high.

A bank with 6 fathoms on it lies southward of Dyo, with the summit of Batang Pele bearing N. 34° E., distant 10 miles.

Alyui bay, between Tanjong Sel Pele and the north-western point of Waigiu, has several high islands in the southern part, the principal being the two Ajé and the two Dujef islands. The passages between these islands are deep, and appeared to be free from dangers. The islet in the middle of the entrance of the bay is a steep rock, about 50 yards in diameter and 98 feet high, covered with vegetation. The village of Alyui lies near the north point of the bay, opposite Mee island. Anchorage may be had off the village in 30 fathoms at about one cable from the shore, with Ruib island peak in line with the west point of Mee island N. 67° W., and the east point of Mee N. 16° W.; the bank is very steep. This anchorage is sheltered by Mee island, and is safe in all winds. Some streams here afford fresh water.

NORTH COAST of WAIGIU.—The northern coast of Waigiu was explored by Captain Forrest in 1775; it is described as generally bold; but reefs extend from some points and islands near the shore. There are several sheltered harbours on the coast where fresh water can be obtained.

Mee island, lying off the north-west end of Waigiu, is 591 feet high, and has rocks off its north and east sides. Its precipitous west end appears, from the south-west, to form the outermost point of Waigiu. There is no passage for vessels between Mee and Waigiu.

Between Mee island and Cape Forrest a bay extends eastward; the entrance on the east side is said to be clear of danger, but a shoal of 3¼ fathoms lies one cable outside the shore reef, with the south point of Mee island in line with the west point of the bay.

There is anchorage in the bay in from 20 to 25 fathoms, coral sand, with the eastern end of the sand-beach bearing N. 65° E. and the north point of the bay N. 20° W.; the mark for the shoal given above is also on.

Cape Forrest (*Lat. 0° 6′ S., Long. 130° 19′ E.*), 2 miles east-north-east of Mee island, is a high, steep ridge, projecting north-westward.

General charts 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Eastward of Cape Forrest is a bay nearly 2¾ miles wide, which affords anchorage on the western side in 16 to 18 fathoms, coral, with the north point of Wunoh islet bearing N. 50° E. and the west point of the bay N. 80° W. Southward of the anchorage and close to the shore is a pointed rock with other rocks around it.

Eastward of the middle of the bay is Wunoh islet, 355 feet high, with rocks extending southward from it, some of them covered with vegetation; these and a projection from the south shore divide the bay into two parts. The eastern part has not been examined, but the western part is deep, except in the small inner bay on the south side, which, however, affords space for small craft.

Plan of Piapis harbour on 912.

Piapis harbour (Telok Saripa) (*Lat. 0° 6′ S., Long. 130° 17′ E.*) is situated about 4 miles eastward of Cape Forrest, and is separated from the bay just described by a narrow, steep, and moderately high tongue of land, at about one cable northward of which are some rocks above water.

The entrance to the harbour lies between these rocks and those which extend more than 3 cables west-north-westward from Pulo Sipsipa off the eastern entrance point, and is stated to be about 2½ cables wide and easily navigable by the eye. The depth is 20 to 30 fathoms. View *a*, at page 252.

On the western side of Haycock rock, 35 feet high, with a depth of 10 fathoms, muddy bottom, close to it. Within, the harbour divides into two arms, penetrating about 1½ miles to the southward. Hill islet, on which there is a pool of fresh water, lies in the centre of the western arm. Anchorage can be had between this islet and the western entrance point in a depth of 15 to 25 fathoms, mud. The plan shows rocks between Hill island and the shore to the westward, but H.N.M.S. *Siboga* moored here in 30 fathoms, mud. In the bight westward of Hill island are some houses and a sand-beach. At the head of the eastern arm there is a small brook of water, and here good timber for masts may be obtained. To enter, steer S.S.E. for Haycock rock, round it at a prudent distance, and steer for the anchorage.

Chart 942b, Eastern archipelago, eastern portion.

Shoe islet lies off the coast about 7½ miles east of Cape Forrest, and three small islets lie eastward of it close to the shore; the Buttons islets lie from 3 to 4½ miles north-north-west of Shoe islet; it is not known if there are any dangers about these islets.

Arago bay, 2 miles eastward of Shoe islet, is about 2 miles wide, and contains several islets.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 30′ E.

Ports Duperrey and **D'Urville** are situated on the west and east sides respectively of a narrow tongue of land about 13 miles east of Shoe islet. Both ports are small circular bays, about 4 cables in extent, with soundings of 10 to 20 fathoms, sand or coral, excepting near the shores, where the water is very shoal in some parts. Both are open to northerly winds. There is a brook of fresh water on the south shore of Port Duperrey, the western, and several streams run into Port D'Urville, the eastern bay.

Plan of Offak harbour on 912.

Offak harbour (*Lat. 0° 3′ S., Long. 130° 45′ E.*) is about 26 miles eastward of Cape Forrest, bounded by high land, and not easily discerned from the offing. On the east side of the entrance stands a sugar-loaf hill, about 500 feet high, and inland there is a conical peak, Buffaloes Horn, which is in line with the hill when bearing S.S.W. The entrance of the harbour is about a quarter of a mile wide in the narrowest part, and 20 to 30 fathoms deep, with one patch of 9 fathoms in mid-channel. The eastern side of the entrance is bordered by a reef to a distance of one cable, and several rocky islets, shaped like beehives, and named Offing islets, lie just outside; beyond these, at a distance of 4 cables north-westward of the eastern point, is a shoal covered by 2 feet of water; a similar shoal is stated to lie between the islets and the shore. The Lélède rocks, also rocky islets like haycocks, lie on the eastern side of the channel entrance. The western side is clear. View *b*, at page 252.

Within, the harbour extends 2 miles to the westward, and 3 miles to the eastward, with depths of 20 to 30 fathoms. To the southward, fronting the entrance, is Repos island, connected with the shore by a reef which also extends 2 cables west of the island, forming an inner port, Jacquinot bay, where the depth is 12 to 20 fathoms, muddy bottom. There is a pool of fresh water on the island. Just to the east of the eastern point within the entrance is a small cove with a depth of 8 to 22 fathoms, in which the *Coquille* anchored; a stream of fresh water enters the cove.

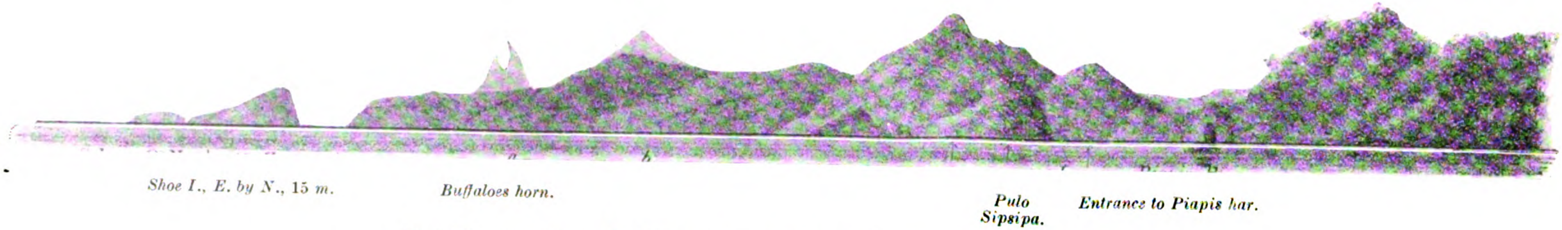
Chart 942b, Eastern archipelago, eastern portion.

Cape Freycinet, the northernmost point of Waigiu, stands 3½ miles east of the entrance to Offak harbour, and is high.

Manuran island, 10 miles east of Offak harbour, is of moderate height, shaped like a sugar loaf, and has some islets off its western side; the channel between the island and the shore is 2 miles wide, with irregular depths of 9 to 20 fathoms.

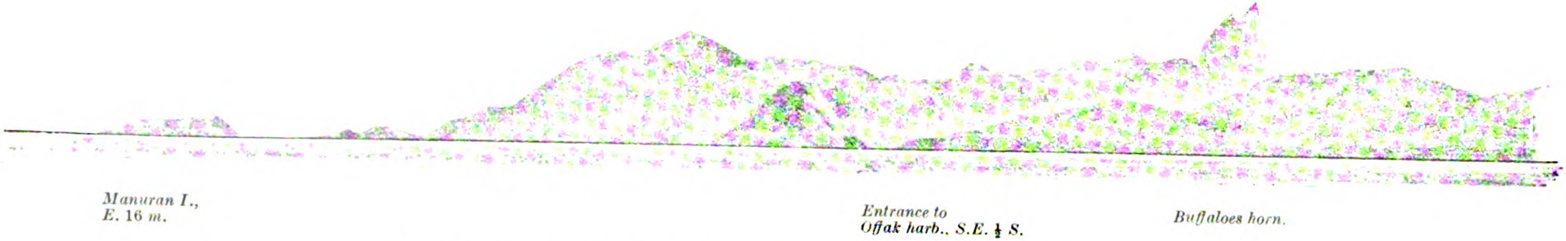
General charts 942b, 2759a, 1263.

(a)


Shoe I., E. by N., 15 m.
Buffaloes horn.
Pulo Sipsipa.
Entrance to Piapis har.

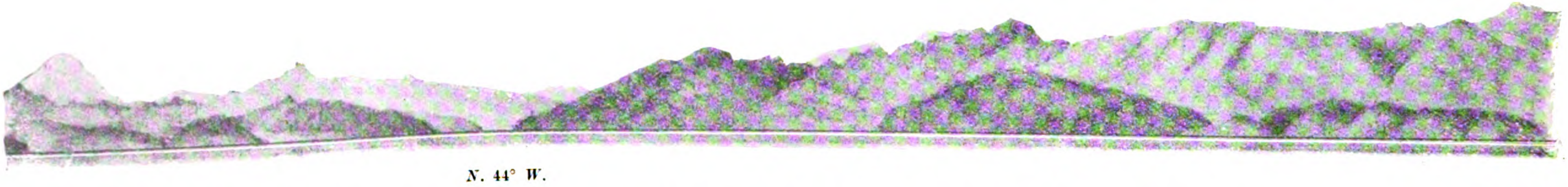
North coast of Waigiu; approach to Piapis harbour.

(b)


Manuran I., E. 16 m.
Entrance to Offak harb., S.E. ½ S.
Buffaloes horn.

North coast of Waigiu; approach to Offak harbour.

(c)



Entrance to Telok Rabiai or Waigiu sea; south coast of Waigiu.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

Shoals.—A shoal, covered by less than 6 feet water, is shown on the chart 4 miles east-north-east of Manuran island. Another bank of 4½ fathoms, but on which there may perhaps be less, is shown as lying 8 miles east of Manuran and 3 miles off the Waigiu coast.

Plan of Lawak and Kabarei bays on 912.

Lawak island and **bay.**—Lawak island lies 3½ miles south-east of Manuran island, and is separated from the coast by a navigable channel about 1½ cables wide between the reefs, and 5 to 10 fathoms deep. Upon the north side of the island there is a remarkable hill. The eastern point of the island projects in a long peninsula, steep-to, called the Dolphin's Nose.

Lawak bay is on the east side of the island between the Dolphin's Nose and the coast of Waigiu, and has depths of 17 fathoms, decreasing to 10 fathoms within two detached reefs, on which the depths are 3 feet and 3½ fathoms respectively, lying a quarter of a mile from the island. A vessel may be tolerably sheltered here in the north-west monsoon, but the bay is open to the north-east and east; there is also anchorage in a depth of 7 to 9 fathoms south-south-east of the south point of Lawak, sheltered from all winds except those from the north-east and north-west. Water may be obtained from two streams on the Waigiu shore. A small village inhabited by Papuans is situated on the highest part of the beach on the south side of Lawak.

Kabarei bay, open to the north-west, is situated 1½ miles south-east of Lawak. Its entrance is about one mile in width, with a depth of 12 fathoms, decreasing to 5 fathoms near the reefs and within. In its south-west part is Port Saouni, formed within some islets and reefs, where small vessels find anchorage in about 2 fathoms, near the village. Water can be obtained in the south-east part of the bay.

Plan of Boni harbour on 1416.

Boni harbour (*Lat. 0° 2′ S., Long. 131° 8′ E.*), about 5 miles east of Kabarei bay, is formed by a bend in the coast, fronted by Boni island and the reef which extends 2 miles north and one mile east of that island.

The northern entrance, between the Boni reef and the narrow fringe reef of the Waigiu coast, is 2¼ cables wide, with a depth of 10 fathoms in mid-channel. Anchorage can be had in 7 fathoms, mud, just within the entrance, or in a depth of 13 to 18 fathoms, sand and coral, about a mile farther in, off the mouth of a stream on the Waigiu coast, west of Boni island. The eastern entrance, between the

Plan of Boni harbour on 1416. Var. 2° 40′ E.

Boni reef and the islet Bombé-dari, 1½ miles south-east of Boni, is deep and 3 cables wide; but few soundings have been taken in it, and the limits of the reefs on each side are not well defined. There is a small village on the south side of Boni.

The French ships *Recherche* and *Esperance* during the search for La Pérouse, spent a fortnight at Boni anchorage in August, 1793; their crews being afflicted with scurvy. Good water was obtained from a stream on the Waigiu shore, south of Boni island, and the natives supplied the ships with turtle, pigs, fowls, sago, and fruit.

The islet Bombé-dari, above mentioned, is connected with the shore to the eastward by a long narrow reef; between this reef and the coast there is a depth of 10 fathoms, mud, probably affording sheltered anchorage, but the place has not been closely examined.

Tides.—According to observations at Boni anchorage by the French ships, it is high water, full and change, at 5 hours, rise of tide 6 feet. The tidal stream ran with a velocity of half a mile an hour; direction not stated.

Chart 942b, Eastern archipelago, eastern portion.

EAST COAST of WAIGIU.—From Boni harbour the coast trends east-south-east for 12 miles to Cape Lamarche (*Lat. 0° 9′ S., Long. 131° 17′ E.*), and then south-south-eastward for 12 miles to Tanjong Momfafa, the south-east point of the island, which is of moderate height. Between the two points the shore is bordered by a wide reef, probably connected with Buccleugh shoal.

Buccleugh shoal lies about 9 miles east-north-east of Tanjong Momfafa and extends 5 miles to the eastward as far as is known, but this shoal has not been examined; on the western end there is as little as 2 fathoms water, perhaps less. In 1877 the U.S.S. *Alert* passed between this shoal and Waigiu island, and though 8 fathoms was the least depth obtained, rocky heads were observed that in many places approached the surface; the water was very clear, and the bottom was seen nearly the whole distance between the shoal and Tanjong Momfafa. This passage must be considered dangerous, and is not recommended.

The SOUTH COAST of WAIGIU is fronted by several detached shoals and islands, and is but little known.

Gemien island appears as part of the south coast of Waigiu, being separated from it only by narrow channels leading into an extensive unexplored bay. It is 15 miles in length, east and west, and composed of raised coral; the southern shore consists of limestone cliffs, underworn by the action of the sea.

General charts 942b, 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

In 1877 the U.S.S. *Alert* anchored in a depth of 20 fathoms near the western entrance of a bay on the south side of Gemien island. From a partial examination of the bay depths of 4 to 10 fathoms were found in the entrance, within which are two islets and several coral reefs having deep water between. Banks were visible extending southward from the two entrance points; on the shore of the bay there are numerous villages.

Tanjong Besir (*Lat. 0° 31′ S., Long. 130° 26′ E.*), at the south-western extreme of Gemien, consists of an island. South-westward of the point a depth of 5 fathoms was found by the police vessel *Pionier*, and when steaming along the south coast of Gemien there was no bottom with 8 fathoms. The islands shown on the chart eastward of Tanjong Besir were not seen.

Kabu strait.—The western entrance to this strait, which separates Gemien from Waigiu, was visited by the police vessel *Pionier* in 1905; it appears like the mouth of a river, the banks being covered with mangroves; not far within, these give place to vertical rock walls. The least width of the western part of the strait is about 55 yards, and the turns are not too sharp for a small vessel. The least depth obtained was 2 fathoms when the strait was passed through in a boat, but it was then about high water. The tidal streams appear to be strong, as the boat had difficulty in getting out of the strait against the west-going stream.

The eastern part of the strait, north-eastward of Gemien, was visited by the police vessel *Pionier* in 1903; no islands were found in the entrance, but farther in is a large island surrounded by islets and single rocks, and another island lies in the broad part of the strait. On the north shore of Gemien large blocks of under-worn limestone of fantastic shapes stand in the water. No bottom appears to have been obtained in the strait, and no discoloured water was seen near the entrance. The *Pionier* anchored in 11 fathoms off a village on the north side of Gemien.

Plan of Saonek anchorage on 912.

Saonek.—The islands Saonek besar and Saonek kechil lie near the south coast of Waigiu, about 6 miles eastward of Gemien island. Saonek besar has a hill on the east point, but is low elsewhere. The island is surrounded by a reef, which extends farthest from the north-west and north-east points, and very little from the north side. The village lies on the north side of the island, which is about a quarter of a mile in extent; most of the houses stand in the water. The inhabitants are said to be Mohammedans. Near the village are some cocoanut trees, and the south side of the island is covered with man-

General charts 942b, 2759a, 1263.

Plan of Saonek anchorage on 912. Var. 2° 40′ E.

groves. The exports are forest produce, brought from Waigiu, trepang, shells, red birds-of-paradise, which are found only on Waigiu and Batanta, but are of less value than the yellow sort. The island itself only produces cocoanuts.

Anchorage (*Lat. 0° 28′ S., Long. 130° 47′ E.*).—Saonek anchorage is off the north side of the island, in from 15 to 18 fathoms at from 1½ to 2½ cables from the shore; it is safe, and little trouble is experienced from sea or swell in either monsoon. The depth increases a short distance outside this position, and thence across to the Waigiu coast it exceeds 30 fathoms. Some reefs lie north-west from Saonek, and must be avoided when approaching the anchorage; they and the Saonek reef show well from discoloration of the water. Vessels remaining any time at the anchorage should moor, on account of the strong tidal streams.

Communication.—Saonek is visited by a vessel of the Royal Netherlands Steam Packet Company on the outward voyage to North New Guinea every eight weeks, and again on the return voyage about eight days later.

Saonek kechil lies a little over a mile north-eastward of Saonek besar, and less than half a mile from the south shore of Waigiu; it is surrounded by a narrow reef.

Chart 942b, Eastern archipelago, eastern portion.

Coast.—Northward of Saonek besar on the Waigiu coast, is Saleo village, in Napérboi bay; thence the coast trends east and east-north-east for about 11 miles to Tanjong Sabula, on the western side of Rabiai bay.

A chain of reefs extends along the greatest part of the south coast of Waigiu eastward of Saonek, at some distance from the shore, interrupted only abreast Rabiai bay. Between this bay and Saonek there is a clear channel between the reefs and the shore, off which but little reef extends; vessels keep about 4 cables from the land, with a good lookout at the masthead. The reefs on the south side of the channel mark themselves sufficiently.

Telok Rabiai or Waigiu sea is a gulf extending in a north-western direction, penetrating Waigiu to within less than 2 miles of the northern coast on the south side of Offak harbour, and nearly cutting through the island. At its northern extremity there is a safe harbour, named Port Blosseville by the officers of the *Coquille*, who examined it from Offak harbour. The gulf has not been surveyed, but it has a narrow entrance between banks 500 to 1,200 feet in height, within which are narrow channels between rocky islands leading to the broad part of the gulf, the shores of which are low; it was

General charts 942b, 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

visited by the police vessel *Pionier*, when it was found that the head of the bay is incorrectly drawn on the chart. The tidal streams were found to run with great strength, necessitating full speed in order to make progress. Strong tide rips in the narrow entrance prevent it being used by large vessels. The entrance can be approached with safety by keeping Tanjong Waisewis, the western entrance point, on a N. by W. ¾ W. bearing, until King William island is in line with the two points of the coast south-west of the entrance; when the course must be altered for the anchorage off Moreha, which lies on the north shore of Rabiai bay, at the entrance of the gulf. View *c*, at page 252.

Plan of Moreha road on 912.

Moreha road (Momos) (*Lat. 0° 21′ S., Long. 130° 58′ E.*).—The population of Moreha village is principally Malay, but they are generally absent; one only finds some Wiakkers, who live at the west end of the village in large houses with turtle-back roofs. The village is on the beach, with level ground behind it. There is anchorage in a depth of 9 or 10 fathoms half a mile south of Moreha with Tanjong Kebang Kele bearing East. Moreha road should be approached with the flagstaff bearing between N. ½ W. and N.N.E., in order to avoid the reefs on either hand, which lie at the distance of about 3 miles from the village. From Saonek the channel between the chain of reefs and the shore may be used. The islet eastward of Kri in line with the south point of Kri astern, S. 54° W., leads between Waigiu and the detached dangers, to off the entrance to Rabiai bay.

Chart 942b, Eastern archipelago, eastern portion.

Coast.—From Moreha the coast trends eastward for about 22 miles to the south-eastern point of Waigiu, but little is known concerning it. A great many reefs are reported to lie off this coast at some distance from the shore, with a navigable channel inside them. After passing southward of a reef to the eastward of Moreha, the Netherlands Government steam vessel *Brak* steered eastward; at about 11 miles eastward of Moreha a very extensive discoloured patch was seen, with a probable depth of from 4 to 5 fathoms over it. There was a clear passage between it and the shore. Menjai islet lies close to the shore, abreast Wakkere village; it has a small beach on the east side, with two houses on it. Wakkere is less accessible owing to reefs. Off Menjai and farther eastward various reefs and a sandbank were seen. The course then led between Waison islet and the shore, and during the whole passage no bottom was obtained at 10 fathoms; a lookout from aloft is necessary.

Waison and Wayam, called Wajim islets in the Dutch Sailing Directions, are two wooded islets situated about 7½ miles eastward of

General charts 942b, 2759a, 1263.

Wakkere, and near the south-east end of Waigiu. They are said to lie close together, forming one island at low water. The channel between them and the shore carries more than 10 fathoms.

Grosvenor reef, of sand and rock, covered by 9 feet water, and with no bottom at 60 fathoms close-to, lies about 6 miles south-east of Tanjong Sabula, but its exact position is not determined.

Bombay bank (*Lat. 0° 29′ S., Long. 131° 12′ E.*) is a dry sandbank, which is charted about 5 miles S.W. ½ S. of Wayam island, but its position is doubtful; between it and Wayam and about 1½ miles from the latter another doubtful bank is shown. Bombay bank is stated to lie nearer the shore than charted.

DAMPIER STRAIT, also named Gemien strait, separating Batanta island and the north-west coast of New Guinea from Waigiu, takes its first name from the great English navigator who explored it. It is about 65 miles long between Tanjong Mabo, the west point of Batanta, to Tanjong Momfafa, the south-east point of Waigiu; but the narrower and difficult part of the strait northward of Batanta, is only 30 miles long. The soundings are in general deep, and irregular in the narrow part, the bottom gravel, with coral and shells in some places. *See* views of approach to strait at page 258.

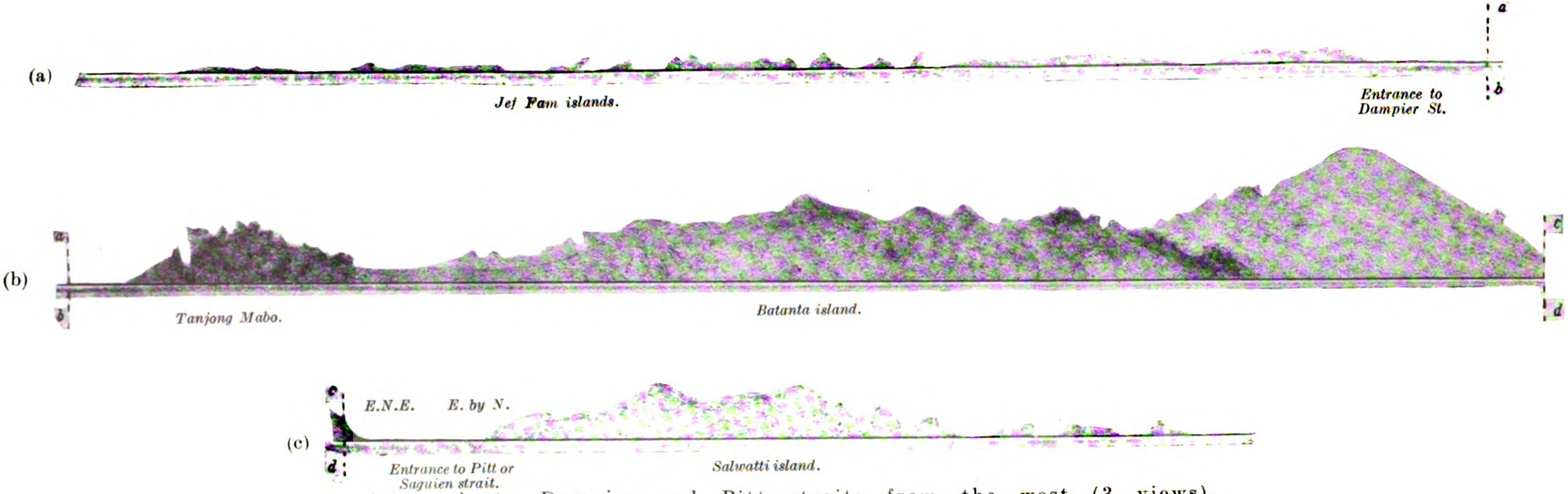
This strait has not been surveyed; the islands and reefs in it have been laid down from various authorities, and their positions can only be considered approximate.

Winds.—In general the winds are variable in Dampier strait, but in December and January sudden squalls from North and N.W. are experienced in its northern part, with heavy rain and a great swell from the south.

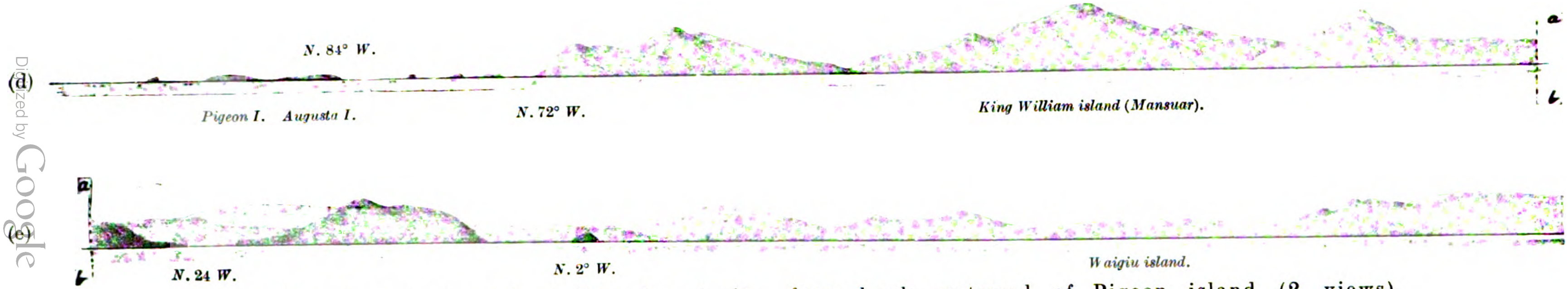
Tides.—Systematic observations as to the tides are wanting; it appears from such observations as have been recorded that it is high water at full and change about 6 hours; springs rise 10 to 12 feet. The flood stream sets to W.S.W., and the ebb to E.N.E., but the streams appear to be greatly affected by the prevailing monsoons.

In the height of the north-west monsoon, in the narrow part of the strait, between Pigeon and Jerief islands, the ebb at springs runs to the E.N.E. for 6 or 8 hours at the rate of 4 to 5 knots, and from one to 3 knots at neaps. The flood sets south-west for 3 or 4 hours, but is weak. During the height of the south-east monsoon, in this part the flood sets westward for 8 or 10 consecutive hours, turning successively W.S.W., S.W., and S.W. by S.; it then attains its greatest velocity, which at springs sometimes exceeds 5 knots an hour, and at neaps 4 knots. The ebb at this season runs E.N.E. or N.E., and is neither strong nor of long duration; however, a rate of 4 knots during one or 2 hours has been observed.

To face page 258.]



Approach to Dampier and Pitt straits from the west (3 views).


(d)
a
b
N. 84° W.
Pigeon I.
Augusta I.
N. 72° W.
King William island (Mansuar).
(e)
a
b
N. 24 W.
N. 2° W.
Waigiu island.

North side of western part of Dampier strait; from bank eastward of Pigeon island (2 views).

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

The ebb stream is generally strongest at the eastern entrance of the strait in both monsoons, and during the south-east monsoon an easterly stream sometimes runs for two or three days together.

Islands on north side of Dampier strait.—Jef Fam islands, lying off the western entrance of Dampier strait, form two groups of islands occupying a space about 17 miles long north-east and south-west, and 10 miles wide, that is entirely unexplored. The northern group is said to consist of five rocky and moderately high islands, and the southern group, also five in number, are low.

Great Fam, the northernmost and highest island, rises to a sharp peak 689 feet above the sea. The north-west point is formed by three low rocky ridges which evidently continue under water. Anchorage was found near this point at 4 cables from the shore in 19 fathoms, stony ground, with the western extreme of the island bearing S. 9° W. and the north point of the rocky islet eastward of Great Fam S. 61° E. The depths here are very irregular. The south-western of the Jef Fam islands is the smallest and low.

A berth of at least 4 miles should be given in passing south-east of them, as in 1877 a line of coral reefs was seen from the *Alert* lying parallel with their south-east side, with apparently deep water between. View *a*, at page 258.

King William island or Mansuar (*Lat. 0 37′ S., Long. 130° 34′ E.*) is about 7 miles long, east-north-east and west-south-west, and high, being visible at a distance of 35 miles; when first seen in coming from the eastward, the two hills on it and Kri island appear like three separate islands. The shores are steep and in most parts are covered by trees; on the eastern extremity there is a white patch. The island is surrounded by reefs; on the north side there is deep water at a quarter of a mile from the shore. An islet, from which a large reef extends northward, lies about 4 miles north-westward of the south-west point, and Kri, a high island with a round rocky islet a short distance outside it, lies off the east end of the island; the rocky islet in line with an islet named Camphuis to the north-north-east is a good mark for the approach to Saonek from Dampier strait. There is anchorage off the south-east side of King William island close to the shore, near some islets. King William island is uninhabited. View *d*, at page 258.

The passage between King William island and Gemien is much obstructed by coral reefs, and is very little known.

Augusta and Pigeon islands are two small low wooded islands, lying south of King William island, and forming the north side of the narrowest part of Dampier strait. They are surrounded by reefs with intricate channels between them, and vessels are recom-

General charts 2759a, 1263.

mended not to attempt to pass between them. A chain of coral patches appears to extend 4 miles from Augusta island in a west-south-west and 2 miles in a southerly direction.

The channel between Augusta island and King William island is about a mile wide, and has reefs in it. Vessels may pass through this channel by keeping about 2 cables from the shore of the larger island.

The coral reef on the south side of Pigeon island, with only 3 or 4 feet water on it, projects about a cable's length, and the water deepens quickly to 10 fathoms; from the east end of the island a reef, partly above water, extends a quarter of a mile.

Anchorage.—The U.S.S. *Alert* anchored in a depth of 10 fathoms, coral, with 6 to 10 fathoms around, southward of the opening between Augusta and Pigeon islands. There is a bank about 3 miles eastward from Pigeon island with depths of 4 to 15 fathoms on it suitable for anchorage, the bottom being mostly sand and gravel. *See* views *d*, *e*, at page 258, and *a*, *b*, at page 264.

Woodford shoals (*Lat. 0° 42′ S., Long. 130° 25′ E.*) are several rocky patches on which the *Woodford* and other vessels have struck, lying south-westward of King William island; three patches are shown on the chart, lying 6, 9, and the other patch of 4 fathoms, 12 miles, west-south-west of Augusta island; but there are probably many other shoals between King William island and the Jef Fam islands, as that region has not been examined.

Sittart reef is charted in a position 5 miles East of Pigeon island. The position is immediately to the eastward of the 4-fathoms bank mentioned above under "Anchorage." The south point of Augusta island in line with the north point of Pigeon island leads about 1½ cables southward of Sittart reef in more than 10 fathoms, but about one mile farther eastward is a bank with 6 fathoms least water. At about 2 miles farther eastward discoloured water was seen at about 1½ cables on each side of the above line, and farther on the only discoloured water was at a great distance southward.

Batanta island lies on the south side of Dampier strait, and is separated from Salwatti by Pitt strait. It is about 35 miles long east and west, from 4 to 8 miles broad, and high, being visible at a distance of 30 miles. It consists of a chain of densely-wooded mountains, the highest of which has an elevation of 3,676 feet. On the north coast are two villages, the western, named Saleo, lies about 7 miles east of the north-west point of the island; the other, named Jinsawai, lies S. by W. from Jerief island, extending a considerable distance along the coast, and appears thriving. The *Pionier* anchored off the village in 27 fathoms. Between these villages the coast is uninhabited. On the south coast are some settlements of Salwatti people. Fisher island, a small high islet, lies about one mile westward of Tanjong Mabo, the western point of Batanta.

Vansittart bank is the shoal water extending north of Batanta, and forming the south side of Dampier strait; its edge is almost steep-to. It gradually increases in breadth from each extremity of the island, its northern part being 6 miles distant and embracing Jerief island, which lies 7 miles east-south-east of Pigeon island. Mansfield island, 5 miles east of Jerief island, is a bank of white sand with a clump of high trees upon it, on the edge of the bank, and within it are numerous islets, scarcely distinguishable, being so near the shore.

According to a report from the police vessel *Pionier*, the bank is not so shoal in some parts as is supposed. Off Jerief island the bottom was seen, but the depth appeared to be 6 fathoms. From here a straight course can be steered to Jinsawai village. Not far eastward of Jinsawai, and near the shore, is an island named Jarif, with a village on its south side and a depth of 16 fathoms in front of it. Hence to the eastward, passing south of another island named Birié, deep water was found, together with some banks. The islands south-east of Mansfield island were not seen. The vessel steamed at from a half to 1½ miles from the high, deeply-indented coast, with deep water everywhere. Two deep bays lie westward of Tanjong Evanas.

The vessel also steamed from Jinsawai to Saleo; westward of the latter place a greater distance was kept from the shore to avoid some shoals the pilot supposed to be there; no shoals or reefs were observed, however. Views *a*, *b*, at page 264.

Plan of Selé or Kabobolol strait on 1416.

Batanta reef, about 3 miles in width, extends about 9 miles eastward from Tanjong Evanas, the eastern extreme of Batanta, and has depths of 2 fathoms near its outer extremity, but it has not been examined. The *Marchesa* crossed the ridge connecting Batanta reef with Vansittart shoal, and found a depth of 10 fathoms with the south-east point of Batanta just open of Tanjong Evanas. Westward of this line the water appeared to be very shoal.

Plan of Marchesa bay on 912.

Marchesa bay (*Lat. 0° 50′ S., Long. 130° 54′ E.*), so named from the yacht which first explored it in October, 1883, is formed between the two eastern peninsulas of Batanta, the land around being elevated 300 to 1,000 feet. In its entrance, which is 2 miles wide, lies Ayam island, about 600 feet high; the safe channel passes north of it.

Thence, the channel extends 3 miles to the west, terminating in Paradise harbour. South of the parallel of Ayam island the bay appears to be full of reefs, but north of this the channel seems clear of dangers, no bottom being found at 10 fathoms up to the entrance of Paradise harbour, which has not been examined. A reef extends 3½ cables east of Scarf point, the south point of Paradise harbour, and midway between this point and Toe point to the north, there is anchorage in a depth of 13 fathoms. Mangrove harbour, within Toe point, is 2 cables wide, with a depth of 10 fathoms, mud.

Directions.—In approaching Dampier strait from the westward, care must be taken to give the Jef Fam islands a berth of at least 4 miles, but the west end of Batanta may be neared, it is believed, with safety. When Tanjong Mabo bears South, a course should be steered to keep within 3 miles of the north coast of Batanta in order to avoid the Woodford shoals, keeping Pigeon island a little on the port bow and passing 2 miles southward of it; bring the islet eastward of Kri island in line with Camphuis islet to the north-eastward, bearing about N. 29° E., taking care that the western part of Camphuis is visible to the left of the front islet. This mark leads safely over the bank of coral and sand eastward of Pigeon island. The bottom is plainly visible, but the least depth is 6 fathoms. If bound to Saonek, pass close to the islet eastward of Kri, and when one or 2 miles beyond it steer more eastward to avoid a reef between it and Camphuis; when abreast the latter steer for Saonek and round its reef by the eye to the anchorage on the north side of the island.

Or, having passed the Jef Doif islands (page 104) steer N. 84° E. with the south point of Kommerrust right astern, taking care not to get to the northward of that line to avoid the Jef Fam reefs, until the west point of Great Fam bears N. 9° E. in line with the west point of one of the southern islands, when alter course to N. 74° E., and when the east point of King William island is open southward of Augusta island Jerief island will be seen ahead. Continue N. 74° E. towards the north point of Jerief until the small summit on West Batanta is in line with a point in front of it, S. 53° W., when steer N. 53° E. On this course the only reefs seen were between the coast and the line joining Jerief and the north-west point of Batanta. As soon as the conspicuous slope on Batanta is in line with the western part of Jerief S. 17° W., steer N. 17° E. for Saonek kechil, and when that island is in sight, the middle of it in line with two summits behind it may be steered for on the same course, and the reef of Saonek besar rounded to the anchorage.

If proceeding to the eastward, when abreast the middle of King William island on the line of Camphuis islet and the islet east of Kri in line, a course should be laid to pass south of the dangers lying off Waigiu, keeping over towards Tanjong Momfafa, in a sailing vessel, if the wind be from the northward, to avoid being driven on to the New Guinea coast by the swell from the north. Great attention must be paid to the set of the currents.

In approaching from the eastward, Tanjong Momfafa should be made out, a good berth being given to Buccleugh shoal, which may be avoided by keeping Wayam island to the westward of W.S.W.; then proceed, reversing the directions given above.

The western part of Dampier strait (*Lat. 0° 42′ S., Long. 130° 38′ E.*) should be passed through in daylight, unless a bright moon can be counted on. Sailing vessels can anchor in the narrow part of the strait to await tide.

The passage southward of Sittart reef is narrow. *See* Sittart reef, page 260.

South coast of Batanta.—Fisher island and Tanjong Mabo have already been described; at 2 miles east of Tanjong Mabo there is a reef between two small islets near the shore. About 12 miles east of Tanjong Mabo there is a bay with a depth of 44 fathoms, black sand, at half a mile from the shore. From the anchorage the west coast of Salwatti bore S. 35° E.; water can be procured here. The *Marchesa* found good anchorage in 17 fathoms in a bay protected by a reef extending half-way across from its eastern point, with Saguien island bearing S.W. ¾ W. Marchesa bay and Batanta reef have been already described.

PITT or SAGUIEN STRAIT, between Batanta and Salwatti islands, is about 30 miles in length between the west point of Salwatti island and the eastern extremity of Batanta reef; it is from 1¾ to 4 miles in width, and very deep. The Salwatti shore is in general high and steep-to; the Batanta shore is also safe nearly throughout, except in some places where it is bordered by rocks to a distance of a quarter of a mile. There are frequent calms in the strait on account of the high land on each side, and the rapid tides are attended with strong eddies by which vessels are rendered unmanageable and subject to serious dangers; this strait should never be taken, therefore, by sailing vessels. *See* views of approach to strait at page 258.

SALWATTI ISLAND lies off the western end of New Guinea; its coasts are regular and without any deep indentations. The north coast consists of limestone hills about 1,000 feet high, but considerably lower than Batanta to the northward. The north coast is higher than the west. Eastward, near Samatti, the coast is low and swampy, with extensive forests of sago, and on the beach cocoanut trees. There are some brooks, but no rivers. Brown coal was found by the German war vessel *Gazelle* in 1875 at West harbour on the east side of Salwatti. Samatti, where the rajah lives, and Sailolof are the principal villages; both have a Mohammedan population; elsewhere there are only some small settlements, mostly occupied temporarily by Papuans from the interior, who sometimes engage in collecting trepang. The Papuans of Salwatti are said to be very good natured.

Near the north-west point of the island there is a small island, Saguien, to the eastward of which there is a bank with depths of 30 to 65 fathoms over it, very near the shore, where vessels have found temporary anchorage.

Plan of Tipin road on 3027.

Tipin road (*Lat. 0° 57′ S., Long. 130° 50′ E.*) lies on the north coast of Salwatti, in Pitt strait, at about 13 miles eastward of Saguien island. There is anchorage off the village in 24 or 27 fathoms about 2 cables from the shore, but it cannot be recommended, as the tidal streams are rapid and irregular.

Tipin village consists of some houses on piles. The inhabitants are Papuans, and are much in touch with foreign traders. Good water can be obtained from the stream at Tipin.

Plan of Selé or Kabobolol strait on 1416.

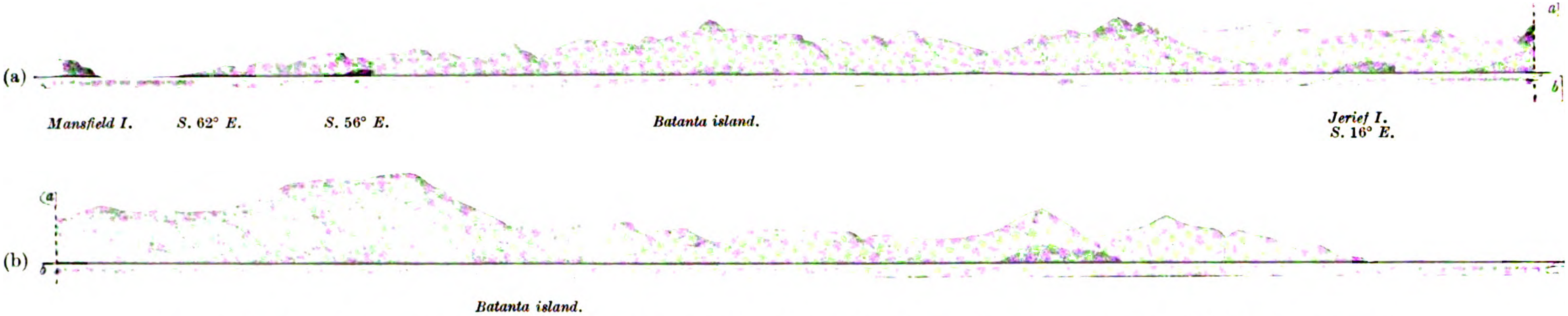
Snapan island, off the north-east extremity of Salwatti, is 165 feet high and surrounded by a drying reef which extends 5 cables east-north-east from the north-east point; several small islets lie close to the northern part of the island, and several islands lie east and south-east of Snapan, in the northern approach to Selé strait.

Samatti (or Salwatti), near the north-east extremity of Salwatti island, is a large village consisting of a long row of houses, some of which are in the water. The sandy strip of coast is only about 35 yards wide, with swamps behind it. The place is not healthy. The principal traders live near Tanjong Kampong, eastward of the village.

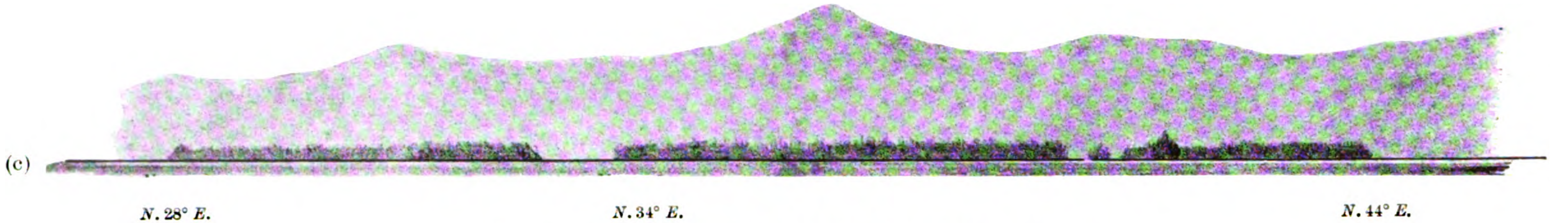
Islands and dangers off Samatti.—A bank partly dry at low water, extends a long way from the shore, so that vessels have to lie at some distance from the village.

Northward of the village, and on the north-west side of the anchorage are some detached reefs, the southernmost of which lies N. 28° E. 1$\frac{1}{10}$ miles from Bam islet; this islet, moderately high and wooded, lies on the edge of the shore reef at 1$\frac{3}{4}$ miles northward of the village, and has several bare rocks near it.

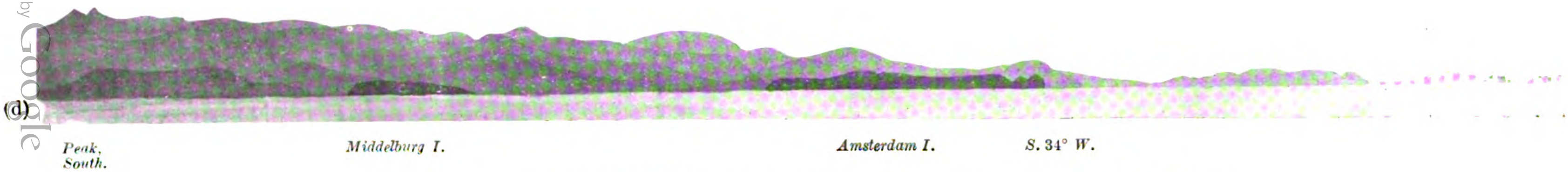
On the east side of the anchorage are the Rombombo islands and the reefs extending from them. Ifmael, the north-eastern island, is low, with a beach and some houses on the east side, which can be closely


a
b
(a)
Mansfield I.
S. 62° E.
S. 56° E.
Batanta island.
Jerief I.
S. 16° E.
a
b
(b)
Batanta island.

South side of western part of Dampier strait; from bank eastward of Pigeon island (2 views).


(c)
N. 28° E.
N. 34° E.
N. 44° E.

Kabu islands, westward of Salwatti island.


(d)
Peak, South.
Middelburg I.
Amsterdam I.
S. 34° W.

Amsterdam and Middelburg islands; N. coast of New Guinea.

approached by boats. On the island are cocoanut plantations belonging to the rajah. A reef extends from the north-east point, as well as westward from the island. The island to the south-west has high vegetation on the north-east end, but is low elsewhere, with a sand-beach. The other two islets are low, with some trees on them and a white beach.

The Katapachan islets or rocks westward of Rombombo islands have a white coloured rock somewhat in the shape of a crouching lion. A detached reef, with 3½ fathoms on it lies about 4 cables west-north-west from the Katapachan, and may be recognised by discoloration and slight breakers.

Anchorage (*Lat. 0° 58' S., Long. 131° 4' E.*).—There is anchorage about 2 miles northward of Samatti village, and three-quarters of a mile from the shore to the westward, in from 7 to 9 fathoms, with Tanjong Kampong bearing S. ¼ E., and the Katapachan rocks seen between Ifmael and the island south-west of it, and Bam islet W.S.W. There is always a north-easterly swell in the anchorage, causing vessels to roll heavily.

Loading and discharging at Samatti can only be carried on at high water. When landing with a falling tide a very light boat is necessary, to avoid grounding on the reef; between the reef and the shore the water is again deeper.

Supplies.—In 1899 the only supplies to be had were cattle. Water is obtained from wells, and is brackish.

Communication.—Samatti is visited when necessary by vessels of the Royal Netherlands Steam Packet Company employed on the North New Guinea route.

Directions.—In approaching Samatti roadstead from the westward, pass northward of Snapan island at a distance of not less than half a mile, and steer for Katapachan white rock (which opens of Snapan island on a S.E. by E. bearing) on a S.E. ½ S. course, until Bam islet bears S.S.W., then steer South for Tanjong Kampong (east of the village), and anchor as previously directed. This latter course leads eastward of a dangerous shoal in the bay. Tanjong Kampong must not be steered for on a course eastward of South, as reefs lie between Snapan island and the reef 11 cables N.N.E. ½ E. of Bam islet.

From Saonek to Samatti, steer direct for Tanjong Sorong or Cape Spencer, to avoid Batanta reef, and when Matan island, with a hill 85 feet high lying eastward of Samatti, bears South, steer for it until Bam islet bears S. 43° W.; steer for Bam on this bearing until the north end of Snapan islet bears N. 72° W., when alter course to S. 31° W., and anchor when the Katapachan white rock is seen between Ifmael island and the island south-west of it.

General charts 942b, 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

The west coast of Salwatti island is little known; the chart shows a bank with several islands on it projecting 4 miles off-shore, abreast and northward of Sailolof, with depths of 7 to 9 fathoms near it.

Sailolof (*Lat. 1° 14′ S., Long. 130° 48′ E.*) is a village on the south-west coast of Salwatti island, south-west of which there is anchorage at the distance of 4 cables from the shore in 7½ fathoms, with the mosque bearing N. 38° E., the minimum depth in the approach to it between Broken islands and Galewo being 5 fathoms. Parallel to the shore on the northern side of the anchorage, and distant 1½ cables from it, there is a reef nearly uncovering at low water, inside of which there is a boat passage.

The village consists of a long, sometimes double row of houses, built on piles on the beach. Behind the village the ground is swampy, giving rise to two brooks that intersect the village; there are also wells. Cocoanut trees are about the village and on the neighbouring islets; cocoanut oil is the principal article of export; there is also a trade with Misol.

Islands and dangers west of Salwatti.—A large dry sandbank is charted at about 5½ miles southward of Tanjong Dadi, the north-west extreme of Salwatti island, and 4 miles off-shore.

A detached bank, about 10 miles in length north-west and south-east, the western extreme of which is about 11 miles westward of Tanjong Waiakar, lies off the west side of Salwatti, separated from it by a narrow channel. The outer edge of the bank is not wholly defined.

Several low islets lie on this bank; the Kabu islets, three in number (*see* view *c*, at page 264), together with two rocks with vegetation on them, lie on the north-west end of the bank; Loslos islet lies on the south end. Valsche Loslos lies 4 miles south-west of Loslos, and is smaller; both are wooded. A depth of 9 fathoms was found 1½ miles west of Valsche Loslos.

Broken islands consist of a cluster of 11 islets, the outermost lying about 7 miles south-westward of Sailolof. They are covered with high trees. At about 5 miles south-east from these islets the depth is 5 fathoms, whence to Tanjong Selé the soundings increase gradually.

Plan of Selé or Kabobolol strait on 1416.

Galewo (Gelo), a small islet lying 2¼ miles from the south-west coast of Salwatti, is the westernmost of several islets situated in the southern entrance to Selé strait; Membok islet, 2¼ miles E.S.E. of Galewo, is the southernmost of the group; *see* page 267.

General charts 942b, 2759a, 1263.

Plan of Selé or Kabobolol strait on 1416. Var. 2° 40′ E.

SELÉ or KABOBOLOL STRAIT, formerly known as Galewo strait, separating Salwatti island from New Guinea, was first traversed by Captain Watson in the *Revenge*, in 1764. It was examined by Lieut. McCluer, who went through it with the *Panther* and *Endeavour*, in 1791; by Signor Cerruti in the yacht *Alexandra*, in 1870; by the Italian corvette *Vettor Pisani*, in 1872; and the German war vessel *Gazelle*, which passed through it in June, 1875. The most recent information is given in the Netherlands Government plan of 1896, but the survey is very incomplete. Much of the following is due to Captain V. Schleinitz, of the *Gazelle*, who states that this strait is preferable for steamers to either Pitt or Dampier straits, the currents, which take the direction of the strait, being weak; and good anchorage is to be found in it.

The strait is strewn with islands, which are nearly all low, surrounded by a belt of mangroves, and are difficult to distinguish one from the other.

Tanjong Selé or **English point** (*Lat. 1° 26′ S., Long. 130° 57′ E.*), the western extreme of New Guinea, and the southern point of entrance of Selé strait, is low and covered with bushes, but behind are ranges of hills 1,000 to 2,000 feet high. Reefs extend about 3 miles southward of the point, for a few cables westward of it, and on the north side about half a cable, with deep water close-to. About 5 miles south-eastward of the point are the two Umpe or Orse islets, surrounded by a reef. Breakers were observed by the *Gazelle* south of Tanjong Selé extending as far as the Umpe islets.

About 2 miles north-eastward of the point is Seget village, the inhabitants of which are seafaring people, their praus going as far as Misol. They are engaged in catching turtle and trepang. At 2½ miles farther to the north-east is Waru village.

Membok islet lies 1½ miles north-west of Tanjong Selé, the channel being between them. Breakers were observed between Membok and Galewo islets and the group of islands northward of them. Membok is uneven or rugged, but Galewo is undulating, and both form good marks for the entrance. The islands southward of Salwatti island are on a reef which extends 4 miles to the southward between the south-east point of Salwatti and Tanjong Menonket.

Directions.—In approaching Selé strait from the southward the depths will be found to vary from 7 to 20 fathoms, changing sometimes more than 4 fathoms between two casts of the lead; caution must therefore be exercised as shoaler water may exist, and the water

Plan of Selé or Kabobolol strait on 1416. Var. 2° 40′ E.

is not clear enough for dangers to be visible. A depth of 4½ fathoms lies 9 miles S. 6° W. from Galewo island. The best course is to head for Galewo island, which can hardly be mistaken for any other island, until Tanjong Selé bears N.E. by E., distant about 3 miles, and then steer N.E. ½ N. into the strait between Membok and Peli islands on the port hand, and Tanjong Selé and Luga islets to starboard. The channel between Tanjong Selé and the reef to the westward is 1¼ miles wide, and westward of Luga islet, one mile wide. Peli has villages on the north and east sides. After Membok island is passed the high south-east point of Salwatti island should be kept a little on the port bow, and passed at a distance of half a mile. The south-western part of the strait from Tanjong Selé, for a distance of nearly 11 miles, forms a wide, deep, and clear channel, for which no particular directions are needed, except that Delfzyl island should be kept on the starboard side. At 3 miles beyond Delfzyl island is the commencement of a wide area filled with islands and reefs, among which, at the southern part, there are several navigable channels that may be used by vessels passing through.

If taking the easternmost route, when off Cape Cora steer about north-east to pass *close* westward of First Passage (Weg) island (on which there was a tall tree in 1875), in order to avoid a sunken reef which lies north-west of it, and which shows as discoloured water. This course, N.E., should then be continued for 2½ miles until a small, high island—Second Passage island—bears about N. by E.; then a course N. by E. ½ E. will lead past the east sides of Second Passage island (which should be kept close aboard to avoid a reef extending 4 cables westward from Reef island) and Third Passage island. A drying rock lies 5 cables N. 20° E. from the north-east point of Third Passage island. These passed, a N. by E. course* for 7 miles will lead up to the passage between Kabra (Watson) island (*Lat. 1°5′S., Long. 131° 9′ E.*) on the east side and the Soraing and Batimé islands on the west, the track lying between scattered islets on either hand. All these islets are wooded; the eastern Soraing islet has a village on the north-west point; Little Batimé has a village on it, and discoloured water was seen off the eastern side.

A reef extends 2 miles N.N.E. ¾ E. from the north point of Kabra island; and the shore reef off the north-east part of Warir island extends in a N.N.E. direction from the south-east end of Batimé for 3 miles along Warir, when it curves northward and westward embracing Kasiem island, which is thickly wooded, and has a sandbank and a village on the south side. A pinnacle rock with 1¾ fathoms over it lies $1\frac{1}{10}$ miles N. 54° E. from the north-east point of Kasiem island. A reef, of coral and stones, with 1½ fathoms on it, extends 4 cables into the channel off the north-west end of Kabra island, and is marked by discoloured water. The track continues in a N.N.E. ¼ E. direction midway between the above reefs until the centre of Kasiem bears W. by N., when a course N. by W. will lead eastward of Matan or Keil island (small and 85 feet high), and between the long, low, Ifmael (Seeland) island and Sop (Tsiof or Exit) island, into the eastern part of Dampier strait.

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* On this course, a depth of 3½ fathoms was reported in 1911, at 1¼ miles west of Memil island.

General charts 942b, 2759a, 1263.

Another route through the strait after passing Cape Cora lies along the eastern side of Great Jefmo island, the coast of which in the middle is rocky and red, and close westward of Caplap island and the two islets immediately north of it, passing south-eastward of a group of three other small islets lying half a mile from the east side of Petermann island; a reef extends a quarter of a mile from the south-east side, and a detached reef lies 4 cables southward of Petermann island, and a similar reef lies 1½ cables south of the southern of the three islets just mentioned; the centre islet of these three has a conspicuous tree in the middle, higher than the rest. Thence the track lies in a N.N.E. direction towards the passage westward of Kabra island, leaving the reef projecting from the north end of Salutun island to starboard, and a bank one mile south-east of Masigi island to port. Segeran islet, north-eastward of Salutun, has detached reefs 4 cables northward and 3 cables south-westward from it. At one mile eastward of Masigi the depth is 4 fathoms. A reef projects half a mile northward from Kafangi islet. Large reefs lying in the direction of the channel are situated between Kafangi and the Torrong islets, and between the latter and Soraing (*Lat. 1° 6′ S., Long. 131° 8′ E.*).

Besides the two routes above described, little is known of the channels in the strait. The police vessel *Pionier* had no difficulty in proceeding from Samatti along the eastern sides of Kabra, Baltiel, and Wolo islands to the south-west point of Princes island. Opposite this island on the New Guinea coast, the rivers Fatja besar and Fatja kechil discharge. The *Pionier* anchored off the entrance of the latter river in 5 fathoms, and a boat ascended it for a distance of 2 miles. On this river beds of coal of recent formation were found.

Anchorages.—There is anchorage in 16 fathoms, mud and stones, at about a quarter of a mile from the shore off Seget village, on a ridge forming a continuation of Luga island; between this ridge and the shore a depth of 22 fathoms was found.

On emerging into the wider area from the southward, a channel will be seen to the north-west between a large and a smaller island; this channel, by keeping the large island (Great Jefmo) on the starboard hand leads to West harbour, where there is very good anchorage in a depth of 10 to 12 fathoms, mud, between Vivien island and the Salwatti shore.

On the opposite side of the strait eastward of Padre point, anchorage may be found in East harbour, but there is only a depth of 4 to 5 fathoms in the entrance, which is immediately north of three small islets lying close in towards the New Guinea shore, and between them and a long, narrow island. When the three small islets are passed, the depth will increase to 7 fathoms, in which a vessel may anchor. A village stands on an islet east of this harbour near the New Guinea shore. The coast consists of limestone, covered with dense wood, and fringed by mangrove swamps.

Tides.—In Selé strait it is high water full and change at 6h.; springs rise 6 feet and neaps 4 feet.

In West harbour (*Lat. 1° 15′ S., Long. 131° 2′ E.*), one flood, and one ebb, each of eight hours' duration, were observed in the 24 hours, succeeded by one flood, and one ebb of four hours' duration. The flood stream sets to the southward, at the rate of one to 2 knots an hour; the ebb runs northward, not quite so strong.

The strongest stream occurred during the eight-hours' tide, and the feebler during the four-hours' tide. The highest high water took place after the four-hours' flood, and the lowest low water after the four-hours' ebb. These remarkable phenomena were attributed to the meeting of the tidal waves of two oceans, the northern being the more potent.*

In the broader parts of Selé strait the tidal streams were less strong and took the direction of the strait.

Winds.—In June, the prevailing winds in Selé strait were south-east, force one to 4, and south-west with a force of 3 to 6. The weather, with the exception of a few rainy days, was fine.

Tanjong Sorong or **Cape Spencer,** the north-east point of entrance to Selé strait, is of moderate height; reefs project to a distance of more than a mile from the cape, as well as from Ram island, which lies close westward of it.

Ram island or Dom, lying close westward of Tanjong Sorong, is wooded, as are some islets lying north of it; a reef on which are five low black rocks, extends nearly 1¼ miles westward from Ram.

Sop island, also called Tsiof, or Exit, lies about 2½ miles southward of Ram island, and 2 miles from the New Guinea shore. It is a long, wooded island, on which are gardens belonging to the inhabitants of Doom island. Off the south-west side are some rocks above water, and on the north side the shore reef extends 4 cables off, with three detached reefs, marked by discoloured water, outside it, the northernmost being nearly 1¼ miles from the shore of the island, and N. 41° W. 1$\frac{7}{10}$ miles from its eastern extreme.

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* Captain von Schleinitz, June, 1875.

Doom island (*Lat. 0° 55′ S., Long. 131° 14′ E.*), 30 feet high, lies about 5½ cables from the shore of New Guinea, eastward of Sop island; the channel between Doom and the mainland is navigable. Reefs extend a short distance from the north and south sides of Doom. The island is too small for the cultivation of anything but cocoanut trees; sago is brought from elsewhere. Good drinking water can be procured from a well on the south side of the island, but it is at some distance from the beach. The village of Sorong lies on the east side of the island.

Anchorage.—The anchorage off the east side of Doom island is safe, except that there is no shelter from southerly winds; if these are strong a vessel can shift berth to the north side of the island. The chart shows a patch of 4 fathoms at about 1½ cables from the east side of the island, but elsewhere the depths appear to be 13 and 14 fathoms. If remaining any time, vessels should moor, on account of the strong tidal streams.

Directions.—To Sorong from the northward, round the rocks westward of Ram island at the distance of half a mile, and steer eastward between them and the reefs northward of Sop island. When the west point of Ram bears North, steer for the islet lying near the New Guinea coast, north-east of Doom island; pass a short distance westward of the islet and to the anchorage off the east side of Doom.

From Samatti, leave the anchorage off that place, steering N. 31° E. until Bam islet bears S. 43° W., when bring it astern on that bearing and steer N. 43° E. until the north side of Snapan island bears S. 77° W.; then steer N. 77° E., with it astern, to pass northward of the reefs off Sop island, and when nearing the rocks westward of Ram island steer more eastward and to the anchorage off Doom island, as before directed.

Sorong village lies on the east side of Doom island; the houses are built on piles at the water's edge; the inhabitants are of Wiak origin, and are Mohammedans. A branch of a Banda firm which rents the pearl fisheries from the Sultan of Tidore, is established here during the south-east monsoon. A surveyor of import and export duties and excise is stationed at Sorong.

Communication.—Vessels of the Royal Netherlands Steam Packet Company on the North New Guinea route, call at Sorong about once in four weeks on the outward voyage, and again on the return voyage from eight to twelve days later. *See* page 17.

General charts 942b, 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

NORTH COAST of NEW GUINEA.—From Tanjong Sorong (Cape Spencer) the coast trends east-north-eastward to Cape of Good Hope, the northern point of New Guinea; it is in general high, but in some places is low near the shore. A short distance inland a chain of mountains from 4,000 to 5,000 feet high, and covered with trees, ranges parallel with the coast as far as the north-west part of the great Geelvink bay.

Batu Lobang is a large rock about 80 feet high lying near the shore, about 9 miles eastward of Cape Spencer. It has an arched opening in it, which can only be seen when near the shore. Off this part of the coast are several rocks at a distance of from one to 3 cables. There is anchorage about here in 25 fathoms at about 3 cables from the shore. About one mile west of Batu Lobang a small river discharges, named Samson.

Tanjong Dorei (*Lat. 0° 46′ S., Long. 131° 30′ E.*), about 18 miles eastward of Cape Spencer, has a bay on its eastern side extending 4 or 5 miles south-westward, where there is good anchorage protected from northerly swell. Hum islet on the east side of the entrance is surrounded by a reef which extends a considerable distance south-westward, as charted, and between this reef and Tanjong Dorei a small reef is shown.

Where the coast near Tanjong Dorei turns to the south-west are three houses standing in the water, inhabited by Sorong traders. The *Pionier* anchored here in 17 fathoms, having entered the bay keeping at a distance of half a mile from the shore, and finding a least depth of 4½ fathoms on the way. The pilot considered it unsafe to go farther in. The shores of the inner part of the bay are swampy, and there are several villages, one of which is opposite Hum islet.

Coast.—South-eastward of Hum islet is Sawatut village and rivulet, which may be reached by boat from the bay just mentioned, through a channel southward of Hum. There is a bank off the village with a small channel through it, and the stream affords clear drinking water.

Asbakin village lies a few miles eastward of Sawatut on a flat beach, on either side of which steep rocks come close to the sea. The wooded coast range consists of red rock. North-west of Asbakin is a shoal of 5 fathoms.

From Asbakin to Maga rivulet there are no bights of importance. The mountains at first come close to the sea, leaving only a small patch of beach in front of Mlahni village, 5 miles east of Asbakin. Farther on there is beach everywhere, interrupted only in one place by a mountain. Near the Maga the mountains lie back from the coast, which here turns northward to the steep Tanjong Sawasar. Along the

General charts 2759a, 1263.

coast the chart shows soundings of from 5 to 30 fathoms at one to 2 miles from the shore, also two reefs in a bay about 10 miles westward of the Maga rivulet.

Anchorage.—Near the Maga rivulet, where Mar village formerly stood, there is anchorage at fully half a mile from the shore, with Tanjong Sawasar bearing N. 19° E., distant 7 cables, and a remarkable rock, N. 79° W. At about 2 cables northward of the anchorage are two reefs, the eastern of which breaks. A reef with heavy breakers extends from the remarkable rock, between which and the reef to the eastward is a 7-fathoms channel. From the last-mentioned reef a small 3-fathoms bank extends south-south-east, with 4½ fathoms between it and the shore. Maga rivulet is shallow and impracticable for boats.

Coast.—From Tanjong Sawasar the coast trends north-eastward for about 23 miles to Tanjong Opmarai. North-eastward of Tanjong Sawasar the coast is steep, and between that point and Tanjong Kasbi the coast recedes but little. Between Tanjong Kasbi and the next, Tanjong Sansapor, is a large bay, into which the Wesan river is said to discharge. Tanjongs Kasbi and Sansapor are shown with reefs extending some distance off them, and at about 3¼ miles northward of Tanjong Kasbi a doubtful reef is charted. Farther eastward the land is level in places near the coast, like at the mouth of the Wewe river. On this part of the coast Mount Disceras, about 10 miles inland, is very conspicuous.

Mios Su islands (*Lat. 0° 21' S., Long. 132° 10' E.*) are two small, low, wooded islands lying north-west and south-east of one another—each about 80 feet high to the tops of the trees, and surrounded by a reef; they are separated by a channel about a mile wide, in which there is a depth of 35 fathoms. The outer island, Amsterdam, lies about 3 miles from the New Guinea coast; a very shallow reef, about three-quarters of a mile broad, extends from the west and south-west coasts of this island to a distance of 2½ miles; great care is therefore necessary in approaching Amsterdam from the southward. View *d*, at page 264.

The reef surrounding Middelburg, the inner island, extends some distance north-eastward, and the north-east point is the lowest, with trees here and there on the beach.

The passage between these islands and the shore is about 1¾ miles wide, and is navigable, and clear in mid-channel; when passing through it at about one mile southward of the islands, depths of from 12 to 16 fathoms were obtained, and when going along the coast of the mainland, which is low here, from 5 to 6 fathoms were obtained at 1¾ cables from the shore. Reefs lie a short distance off Opmarai and Wewe points, and also near the shore between them.

Vessels can anchor southward of Middelburg island.

The islands are difficult to make out at night from the westward, because of the dark coast behind them, but from the eastward they can always be seen, being then open of the coast. The channel can be used at night, when the light is good.

Kor village lies about midway between Middelburg and the Cape of Good Hope, and about half a mile eastward of Sungi Kor; it consists of some Chinese traders' houses; no Papuans were found here. A conspicuous rock, with vegetation on it, lies off the mouth of the river, and westward of the rock is a channel into the river, navigable by boats. A steamboat can enter at high water with a smooth sea, and proceed upwards for three-quarters of a mile, where the depth is from 3 to 4 feet, and numerous rocks begin to appear in the channel; a small boat can ascend a mile farther. The river has a width of from 85 to 110 yards, decreasing to 30 or 40 yards where the depth was from 3 to 4 fathoms. In several places the mountains come close to the banks. Just within the entrance the water is fresh.

Anchorage.—There is good anchorage in the east monsoon off the Sungi Kor in from 6 to 7 fathoms; there is considerable swell in the west monsoon. A good landing place is on the right bank, just within the entrance; with an easterly swell the shore can be approached under the lee of some rocks lying there.

Between Kor and the Cape of Good Hope the coast is clean, and may be closely approached.

Cape of Good Hope (Kain Kain Beba), or Tanjong Jamursba (*Lat. 0° 18′ S., Long. 132° 25′ E.*), 14 miles east of the Mios Su islands, is the northern extremity of New Guinea; it rises somewhat sloping from the sea, and has on the crest a small round hummock by which it is easily distinguished; it is steep-to, there being a depth of 16 fathoms at 3 cables from it. On each side of the cape are some bare rocks, which contrast sharply with the verdure. From this point the coast trends about E. by S. ½ S. for 109 miles to Tanjong Mamori, the west point of Geelvink bay, with several indentations in it. View *a*, at page 288.

Coast.—False cape, 18 miles eastward of Cape of Good Hope, somewhat resembles it, but has a broader appearance, and rises more abruptly from the sea to a height of about 295 feet; it is less wooded than the other points in the vicinity. At 3 cables off the cape there is a depth of 40 fathoms. Tanjong Maganeki lies 35 miles east-southeast from False cape, with Tanjong Ruwe about midway between; south-westward of Tanjong Ruwe is Wauw village, inhabited by

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

Chinese and natives from Tidore and Ternate, besides some Papuans; near the cape are two other small settlements, and eastward of the cape there is a reef near the shore.

Saokorem, about 11 miles eastward of Tanjong Ruwe, is the principal village in the Amberbaki district, and here the Wampai river flows into the sea.

Rice is grown in this district on dry ground near the shore.

Anchorage may be obtained in 9 fathoms, soft bottom, about half a mile from the shore, with Tanjong Saokorem bearing N. 38° W.

Between Tanjong Maganeki and Tanjong Borope, 21 miles east-south-eastward from it, the coast forms a deep bay, with Tanjong Mombrani situated about midway between the other capes; in the middle of the eastern portion of this bay there is a reef about 2 miles off the shore, with a depth of 20 fathoms inside, and deeper water round it. Near Tanjong Mombrani are a river and a settlement of the same name, and at 6 miles south-westward of Tanjong Borope is Kassi river, with some houses near its mouth.

Tanjong Borope (*Lat. 0° 43′ S., Long. 133° 33′ E.*) is reported to be very low and difficult to distinguish at night.

Tanjong Ignesui, Little Geelvink bay, is situated about 11 miles eastward of Tanjong Borope; Oiori river lies about midway between these capes, and on either side of the river mouth, at a distance of about 2 miles, reefs are shown on the chart.

Plan of Little Geelvink bay on 2467.

Little Geelvink bay is situated about 25 miles westward of Tanjong Mamori, and 10 miles eastward of a remarkable conical hill near the shore in the vicinity of Tanjong Borope; it affords anchorage with shelter from north-east and easterly winds and swell in a depth of 20 fathoms, with the north extreme of the bay bearing N. by W. distant about half a mile, or N. ½ E. distant about 1¼ miles. The water shoals quickly to 5 and 3 fathoms, but it is deep close off Tanjong Ignesui, the northern point of the bay. There are rocks on each side of the bay, and a fresh-water river enters its head. The chart shows a reef extending northward from Tanjong Ignesui, and westward of the bay are two villages.

Chart 942b, Eastern archipelago, eastern portion.

Tanjong Saweba (*Lat. 0° 42′ S., Long. 133° 59′ E.*), about 16 miles eastward of Tanjong Ignesui, will be known by Jauru islet off it. A reef with 3 fathoms on it lies 3 cables eastward of the islet. Between Little Geelvink bay and Tanjong Saweba a strip of low land lies between the mountains and the sea.

General charts 942b, 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

Tanjong Mamori, a high and prominent point, may be considered as the western entrance point to Geelvink bay.

Geelvink bay, with islands in it, is described with the coast to the eastward in Pacific Islands Directory, Vol. I.

CURRENT.—On the north-west coast of New Guinea near the equator and in about longitude 132° East, a set to the northward of 4¾ miles an hour was experienced for 10 consecutive hours. Eastward of this position to Dampier island and Astrolabe bay the current was found setting to the westward in the month of May at the rate of from 12 to 48 miles a day. There is a general set to the westward along this coast, the strength of the stream depending on the monsoon, but it is seldom greater than 2 knots an hour.

Tides.—Little information has been gathered about the tides, but high water and low water occur twice in the day.

WINDS and WEATHER.—The most favourable months for the navigation of the north coast of New Guinea are said to be July and August: as, however, sailing ships continually make the passage during the turning of the monsoon in March and April, or October and November, no reliable information can be supplied. The so-called East monsoon prevails from April to September; the most dominant wind is then from South to S.W., so that it might be more appropriately called a South monsoon. During this period there is the greatest rainfall, and it is known as the wet season. The West monsoon prevails from October to March, with north-westerly winds.

Almost everywhere, even during fine weather, there is a swell from the N.N.E.

Islands between Misol and New Guinea.—Off the north coast of Misol there are several islets which extend across the channel between that island and Salwatti, leaving, however, a clear passage north of them towards Pitt strait. The Nusela islands lie north of the northern end of Misol, and between these and Salwatti is a group named Schildpad or Turtle islands, surrounded by reefs (*see* below). All this region has only been very partially explored.

Schildpad islands (*Lat. 1° 27′ S., Long. 130° 27′ E.*).—These consist of nine low wooded islands on one reef. The two small islands to the southward are named Pulo Dua.

A reef about 2 cables in diameter and dry at low water is situated 10 miles N. 55° E. from Lopon, the north-western of the Schildpad islands; and another, about 3½ cables in diameter and dry at low water, is situated 8½ miles N. 60° E. from Lopon. Two other detached reefs, one of them awash at low water, lie about one mile north of the centre of the reef surrounding the group.

A reef about 1½ cables in diameter, with a depth of 2 fathoms, is

General charts 2759a, 1263.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 40′ E.

situated 3 miles S. 50° E. from Pendokoh, the easternmost of the Schildpad islands. The water over it was not discoloured.

Hesketh shoal was sailed over by the English yacht *Goshawk* in 1875. From the shoal part where bottom was seen, and the depth 2¾ fathoms obtained, Schildpad north island, the largest and highest of the group, bore N. by E. ½ E., distant 5 or 6 miles; the next cast of the lead gave 5 fathoms, and shortly afterwards, no bottom was found at the depth of 17 fathoms.

False Pisangs and Seven islands.—The False Pisangs are the easternmost of a range of islands and scattered rocks extending eastward for about 43 miles from the south point of Misol; Daram, the largest island, is 408 feet in height and uninhabited. The rocks northward of Daram are fantastic in form and steep-to, the largest is 280 feet high; some of these rocks are connected by coral reefs, between others there are depths of 30 and 40 fathoms.

A rock shaped like a beehive lies one cable from the south-east point of Daram, and is connected with it by a reef. Nearly 3 cables southward of Daram is a smaller island 276 feet high, part of the south side of which is bare and of a light-yellow colour, visible from a considerable distance.

The reef on the north side of Daram is from a half to three-quarters of a cable wide.

Anchorage was found on the north-east side of Daram, in 27 fathoms, stony ground, off a small beach, with low palm trees on it, at about 2 cables from the reef, with the east side of the easternmost False Pisang rock bearing N. 15° E., and the beehive rock S. 52° E. The depth decreased gradually to the narrow reef, close to the edge of which there were 10 fathoms of water.

Seven islands, a group of steep rocky islands, the highest 212 feet in elevation, lie about 10 miles to the north-west of Daram, and another much higher group lies south-west of them.

Pinon islet (Jef Jus), lying S.E. ¾ S. 23 miles from Tanjong Selé, is a strip of coral sand, about 2 cables long and one cable wide; it is covered with high trees and partially surrounded by a coral reef, open to the north-west, but extending some distance south-eastward.

With south-easterly winds, good anchorage is found at the open side of the coral reef on the north-west side of the islet, in a depth of about 14 fathoms, the middle of Pinon islet bearing S.E. The depth increases gradually towards the islet at 10 fathoms and then suddenly shoals to 2 or 3 fathoms.

A small bank lies about 8 miles N. by W. from Pinon islet.

WEST COAST of NEW GUINEA.—From Tanjong Selé or English point, the western extreme of New Guinea, the

General charts 2759a, 1263.

coast trends generally in a S.E. by E. direction for about 93 miles to McCluer inlet; little is known of it beyond such particulars as are given below and on the chart, and the latter cannot be said to be trustworthy. The coast is low, monotonous, and heavily wooded, fronted by a bank about 4 miles wide in places, so that it is difficult to fix the vessel's position. Islets, and detached banks that are distinguished with difficulty lie far from the shore. On the northern part of the coast a low chain of hills is visible in the interior, with higher mountains behind, and far distant the double summit of Mount Disceras, on the north coast; off the mouth of the Seremuk river this mountain is seen in a north-north-east direction. Several rivers hereafter mentioned discharge on this coast; of these the Kabrara is probably the only one that breaks through the mountain chain. The others, as far as is known, flow in an east and west direction, and take their rise on this side. Smooth water is necessary when visiting this coast; the depths are small, and with a sea it is difficult to search for the channels giving access to the rivers. Vessels touch in places where the depth is sufficient in smooth water, and grounding may have fatal consequences. Caution is therefore necessary.

Segun bay (*Lat. 1° 28′ S., Long. 131° 22′ E.*).—From Tanjong Selé (*see* page 267) the coast trends eastward for about 16 miles to Fisherman point (Tanjong Wamonket), and is low, with some islets off it. Segun bay, eastward of Fisherman point, is said to have depths of not less than 4 fathoms, with 2 fathoms outside it.

The Segun river discharges on the western side of the bay; at the entrance of the river a reef extends from the right bank and a bank from the left, with from 3 to 5 fathoms between them. For a distance of 8 miles from the entrance the depths are from 4 to 10 fathoms; a little higher up a rock obstructs the passage, and the river narrows to half a cable, but afterwards increases in width till at 3 miles higher it is over three-quarters of a cable wide. The water was salt up to this point, and the banks, except in some places, low and covered with vegetation. The agas, small flies whose sting produces a violent burning sensation, are very troublesome.

Tanjong Jamtup is the eastern point of Segun bay, and an extensive bank stretches southward from it.

Jef Kabolim is an islet lying nearly between Fisherman point and Tanjong Jamtup, and about 7 miles from the former; an extensive dry bank is shown southward of it.

Jef Jal islet lies about 9 miles southward of Tanjong Jamtup, and is surrounded by a reef. There is a small shallow well of fresh water on the islet. There is anchorage southward of the islet, in 7 fathoms, which must be approached with caution, as the muddy water prevents the reef from being seen.

Jef Matel (*Lat. 1° 33′ S., Long. 131° 33′ E.*) is an islet about 7 miles northward of Jef Jal.

Beraur river discharges between Tanjong Jamur and the Sille Sabak. The lower part of the river trends north and south, and the entrance is plainly seen from the southward. Passing eastward of Jef Matel, the river was entered without difficulty, the least depth obtained being 3 fathoms. Near the western entrance point are two rocks and near the eastern point one rock; the banks are low and swampy.

The river was ascended for a distance of 25 miles to a point where it is formed by the confluence of the Merarin and Giliwolo rivers; there it is about 50 yards wide and 7 fathoms deep. The Merarin flows from the north and along it mountainous country is probably reached in a short time. The course of the Giliwolo is apparently in an east and west direction. From the Beraur the Kabrara river was reached by the Sille Jamka and the Fagu.

Kabrara river has two mouths; the eastern and proper mouth is shoal; the western mouth named Sille Sabak is at first about 8 cables wide, and maintains a width of more than a quarter of a mile to its junction with the Samesan at about 4 miles above the entrance. Higher up it becomes narrower, and when it leaves the Kabrara is about half a cable wide. The water was fresh 8 miles from the entrance.

On the bar of Sille Sabak (*Lat. 1° 31′ S., Long. 131° 35′ E.*) at half tide, a depth of one fathom was found, with the north end of Jef Matel in line with Tanjong Jamtup. The bar is very broad and the channel tortuous. With a falling tide here a strong stream runs west-south-westward. It is estimated that the depth on the bar at low water springs is from 2 to 3 feet. The entrance is approached on a North bearing; when Tanjong Tanjar, the first point eastward of the Kabrara river, was in line with Tanjong Kakmela, the depth in the Sille Sabak was 3 fathoms. When intending to visit these rivers it is recommended that a pilot should be obtained from Sailolof.

The Kabrara has a width of over 2 cables where the Sille Sabak branches off, but about 4 miles higher up, where the Fagu river enters through the right bank, it becomes narrower, and the depths, which have been from 4 to 7 fathoms, are more irregular. In the broad part of the river the water is fresh. The lower reaches of the river are easily navigable; above the mouth of the Kelakais, a tributary on the left bank about 6 miles above the Fagu, the left bank

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

should be avoided on account of rocks on that side. The banks are low at first, and close along the river are sago trees. About 4 miles above the Kelakais, the river flows through a range of limestone hills, trending east and west, and about 300 feet high, which rise abruptly from the mud-land. The width of the river below the hills is about half a cable, but is less than half that width between the vertical banks; here the depth is 2 fathoms, flat stones, and the current so strong that an 8-oared boat could make no way against it.

The Seremuk river discharges eastward of Tanjong Kakmela.

Kaibus bay, between Tanjong Seleboi on the north-west and Tanjong Bakoi on the south-east, forms the estuary of a river. A shoal extends southward of Tanjong Bakoi, and a bank above water lies about 3 miles south-westward of it. Depths of less than 2 fathoms were found in the bay; the deepest water appeared to be close along the bank extending southward from Tanjong Bakoi, where there were not less than 4 fathoms. Ascending the river the course for the first 9 miles was north-eastward and then northward for 3 miles. On the latter course the mountains are closely approached, when the river suddenly turns eastward and becomes narrow. Two small streams join the river here. The inhabitants are very shy and live in the forest; they are visited only by traders, who barter hatchets and articles of dress for sago. The water is fresh close to the mouth of the river.

Coast.—Tanjong Sibabu (*Lat. 1° 46′ S., Long. 131° 55′ E.*) lies south-eastward of Tanjong Bakoi, and is prolonged by a bank, covered with bushes for a great distance. Aninemru river discharges between these points.

Between Tanjongs Sibabu and Rumoninpuri is Waromgé, a broad and shallow bay, forming the entrance to the Waromgé river. The mouth of the river is very wide; about 4 miles above the entrance and past the Begerak, a tributary on the left bank, it becomes a little narrower, and at 4 miles farther it is narrower still, where the Sirisara joins the left and the Gimna the right bank, respectively. About 8 miles farther up fresh water was found. The river was ascended for 30 miles by the *Pionier*, when the vessel grounded, near the first place where one of the banks was high. Below this the depths were very irregular, but not less than 2 fathoms. A little higher up the river is formed by several small branches.

The Rumoninpuri river discharges by the point of that name, and between it and Tanjong Rur are the Suaboor and Siari rivers, with points of like names near them.

Tanjong Rur has high trees on it, and is visible from a considerable distance.

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

Metamani bay.—Kais river flows into Metamani bay, so called from the river of the same name, which discharges into it. The Kais can only be approached by vessels of from 4 to 5 feet draught owing to a bank of sand and mud lying in front of the entrance. In front of the bay a bank extends seawards about 4 miles, with a depth of about 1½ fathoms.

The width of the river is from 1½ to 3¾ cables, with depths varying from 3 to 8 fathoms and more. The water is fresh at the entrance. At about 6 miles from the entrance are some temporary settlements of fishermen on the right bank, and at 25 miles distant is Kauting village; other villages were found above this. The banks of the river are low, swampy, and covered with mangroves and nipa. At Kauting village the bank is somewhat higher, and there is a change in the vegetation. Opposite the fishermen's settlements mentioned, some streams join the river, forming a connection with the Metamani river, and along them the villages of Rumakai and Metamani may be reached. About 5 miles below Kauting, the Joswain river flows through the right bank, where two or three houses stand.

A second mouth of the Kais river lies eastward of the main entrance, and is navigable by small vessels.

Metamani river discharges eastward of the Kais river; it was ascended for 16 miles. A channel with 2 fathoms least water lies close along Tanjong Uaim, the eastern point of Metamani bay, after passing which the channel inclines to the right, and soon increases in depth to 6 fathoms and more as the Metamani river is entered. At the highest point reached the depth was little less, and the water was still salt; the width of the river, however, was much reduced. The banks are everywhere low and covered with mangroves.

Coast.—From Metamani bay the coast trends S.E. by E. for about 22 miles to Tanjong Sabra, at the entrance to McCluer inlet. On this part of the coast the Sigaroi or Bira river discharges; on the side branches of this river, which have no fresh water, lie four villages, the houses of which are built on very high piles above mud-flats from which the mangroves have been cut away. Mosquitoes and agas swarm in the swamps. This region, named Bira, is thickly inhabited, and is the principal sago country; the largest village has a population of about 1,000. The natives are seafaring people, and have good praus.

Off the Sigaroi river a bank of hard sand extends one mile from the shore; a channel across the bank was found in 1910, in which the least depth was 4 feet at low and 11 feet at high water, and when inside the river is wide and deep. From 4 to 5 fathoms were found as far as Robabuam village, about 5 miles up the river, on the right bank,

General chart 2759a.

and consisting of some large houses built on piles in a cove dry at low water.

McCLUER inlet (*Lat. 2° 30′ S., Long. 132° 15′ E.*), so named after Lieut. McCluer, who sailed up it in 1791, is known as Telok Berau by the natives. It is an extensive gulf which reaches to within about 19 miles of Geelvink bay, thus almost insulating the north-west part of New Guinea.

The inlet is 20 miles wide at its entrance between Tanjong Sabra and Tanjong Salakiti, narrowing to 10 miles at the entrance to Bintuni gulf. The south coast for 35 miles east of Tanjong Salakiti is high and bold, but the rest of its coasts are low and overgrown with mangroves. All the islands, as well as the shore of McCluer inlet, consist of limestone formation, the surface of which is just sufficiently decayed to favour luxuriant vegetation.

Several rivers fall into the Bintuni gulf, the entrances to which are blocked by mangrove islands. The shores are but thinly inhabited, especially the northern.

Behind the north shore of Bintuni gulf is a range of hills about 300 feet in height; a second range, of about 2,000 feet in altitude, being situated farther back.

Soundings.—Close to the south side of the entrance the soundings are from 30 to 49 fathoms, but further northward the depths vary between 15 and 25 fathoms. Caution should be used in approaching the shoal parts of the coast of McCluer inlet, as mudbanks having from 2 to 3 fathoms over them extend from the shore in many places.

North side.—The northern shore of McCluer inlet extends in an east and west direction, and is everywhere low and covered with vegetation and swampy in places. It is fronted in some parts by mudbanks extending from a half to 2 miles from the shore. From the western entrance point, Tanjong Sabra, situated in about long. 132° 20′ E., the coast trends eastward for 20 miles to some villages; three rivers discharge on this part of the coast. Off the western river, the depth is 4 fathoms at one mile from the shore, but off the eastern, which is near the villages, shoals extend some distance from the land; the centre river is marked by high trees, showing the locality to be less swampy than others.

The villages above mentioned are six in number, and situated near each other; the inhabitants are treacherous and held in fear by those of other parts of the gulf on account of their frequent piracies. These villages have a natural protection in an extensive mudbank, dry at low water, and half a mile wide, making them difficult of access; shoal water extends over 2 miles from the shore abreast these villages.

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 2° 50′ E.

Eastward of the villages, at distances of 5 and 12 miles respectively, are the entrances of two rivers, the eastern of which, the Sebjar, was ascended for 30 miles by the police vessel *Pionier*. The breadth of the river is from a half to one cable, and the depths decrease upwards, but no particulars are given; numerous snags were encountered. The banks are low, and for a great part overflowed at high water; the water is fresh near the entrance. There are numerous villages on the river.

The other river mentioned, the Wirjagar, is difficult to approach owing to a bank in front of the entrance.

Plan of Patippi bay on 1416.

Tanjong Tatingar (*Lat.2°47′ S., Long.131°56′E.*), or Tanjong Fatinga, is the western extremity of Three Capes peninsula, on the south side of McCluer inlet. The peninsula takes its name from its terminating to the westward in three capes much resembling each other, the central and highest one being 640 feet in height. Behind the point the wooded land rises to an elevation of 1,640 feet, and thence a chain of hills about 2,000 feet high extends to the eastward. The tidal streams set strongly over a reef that extends from the point, causing heavy tide rips.

Dangers.—Mariners are recommended to give Tanjong Tatingar a berth of at least 2 miles, as a shoal with a depth of 3½ fathoms over it is situated 1½ miles S. 85° W., and another shoal on which the depth is unknown 1½ miles S. 50° W. from the point; and there may be others in the neighbourhood.

Waas islet, lying close off the village of Atti Atti, at about 3 miles north-eastward of Tanjong Tatingar, is rocky and covered with bushes, and vessels must pass north of it. Vessels can anchor in a depth of 20 fathoms, sand, on its west side, with the north point bearing between N.E. by E. ½ E., and E.N.E., protected from the south-east winds; also off the centre of the east side, in 15 fathoms, protected from south-west winds. A rock above water lies one-third of a mile from the shore, about midway between Tanjong Tatingar and Waas islet. Sagemur islet lies about two-thirds of a mile east of Waas islet, and close to the shore.

Patipi.—From Waas islet the coast trends 4 miles east-north-east to Patipi village; between, there are two bays, Telok Tawar and Telok Salakiti, with villages on their shores. Patipi, a prosperous village, with about 500 inhabitants and some 40 houses, is picturesquely situated in a small shoal bay sheltered against wind and sea by some high rocky islands; it is built in the water, and also partly on the islet opposite; there is a mosque covered with zinc. The

Plan of Patipi bay on 1416. Var. 2° 50′ E.

bay proper is closed by a coral ridge on which is a drying sandbank; off the houses there is sufficient water for the trading craft to lie afloat. The coral bank slopes steeply seaward.

Anchorage.—It is not advisable to anchor near the islands off Patipi village on account of the irregular depths (4 to 9 fathoms), the stony bottom, and the strong tidal streams. A good anchorage is in 7 fathoms, clay, westward of the village, with the south-west point of Telok Salakiti bearing S. 32° E. and Patipi village N. 76° E.

Patipi bay (*Lat. 2° 43′ S., Long. 132° 13′ E.*) or Serat Leng,, extends about 9 miles eastward, with a greatest width of 4 miles. The entrance between the point north-eastward of Patipi village and Tanjong Wetin is about 1⅓ miles wide, and the depths within are from 7 to 10 fathoms, affording anchorage protected from all winds. The depth at the head of the bay is shown as 3¼ fathoms, but 2 fathoms less water has been found here. A reef extends 1½ cables off-shore eastward of Tanjong Wetin.

The south shore of the bay is much indented, and has some islets off it; there are several settlements on this shore.

The north side of the bay, on the west, is formed by the steep Breusing peninsula, 328 feet high; Itupa village, with a mosque, lies on the beach, and near the centre of the north shore of the bay is Wirango village. The bight westward of Wirango is filled with reef. A clear mountain stream falls into the head of the bay, whence a path leads to Segaar. The natives are said to be peaceful.

Islands off Tanjong Salakiti and Segaar bay.—From Tanjong Salakiti, on the north side of Breusing peninsula, the limestone coast trends 12 miles eastward to Segaar bay, and has two small wooded islets off it, with deep water near the shore. Off Segaar bay a chain of wooded islands and islets extends for a distance of 9 miles, lying parallel with the coast.

Plan of Segaar bay on 1416.

West islands, a small group at the western end of the chain, consist of one large and a few small islets, and south-east of these are the numerous Surega islets.

Oger island, the largest of the chain, follows next; it is high, rocky, and wooded: Oger village lies on the north-west side, and Mudin village on the south-east. Pigeon channel, separating it from the shore, is encumbered with islets, but a passage, with depths of 12 to 17 fathoms, passes close along the east side of Oger island, between it and the East islands and along the south shore of Oger into Segaar bay.

East islands consist of Arguni island and numerous islets, with depths of over 7 fathoms between them and the shore.

Plan of Segaar bay on 1416. Var. 2° 50′ E.

Arguni island, lying about 2¼ miles eastward of Oger, is high and wooded, with a village on its south side in a small bay. Off that side are some islets and rocks. Reefs extend for some distance from the east and west ends of the island; that off the east point has a depth of 5 fathoms outside it, and the same depth was obtained at a distance of 7 cables from the point.

Anchorage.—Large vessels can anchor south-south-west of the village on Arguni island in 22 fathoms at 4 cables from the shore, sheltered from westerly winds.

SEGAAR BAY (*Lat. 2° 41′ S., Long. 132° 24′ E.*), which extends about 3 miles inland, terminating in a brackish rivulet, is sheltered from the northward by the above-described chain of islands and islets, and there are several islets within the bay. Entrance peninsula, on the west side, hides the bay from seaward, but on approaching it may be easily recognised by its bluff points, 60 to 80 feet high, with some islets close to. A 3¾-fathoms bank extends from the south shore to the middle of the entrance, with anchorage off its extremity in a depth of 5 to 7 fathoms, sheltered from all but W.N.W. winds. The shores of Segaar bay are densely wooded, and there are several villages, generally built on piles 6 to 7 feet above the level of the water. Completely sheltered anchorage will be found in Gazelle harbour, the bight on the south-east side of Entrance peninsula, which can be approached by passing west of the shoal, and within 1½ cables of the peninsula, in depths of 5 to 8 fathoms. When past the shoal, steer with caution towards the village of Sisir, on an islet on the south side of the harbour, and anchor in 4¾ to 5¼ fathoms, mud, good holding ground, with the south point of the peninsula bearing between N. and N.W. by N., and the village between S.W. and S.W. by W.

The southern part of the bay has about 3 fathoms at the entrance, shoaling inwards. The Kaja Uni (Kajoni) river flows into the head of the bay. Segaar village lies on the west side, at the mouth of the river, near a steep islet: it is built on piles in the water, but the mosque is on the shore. This place being found unsuitable for trade, a place was found eastward of Sisir, where the depth was 4 fathoms at a cable from the shore, and in the neighbourhood of which vessels can anchor. Here a building was erected on the edge of the reef, which dries at low water, for a Custom-house goods shed, and all loading and discharging are done there. The building is connected with the shore by a pier about 150 yards in length. The dwellings of the police inspector and others stand on the shore. This establishment appears to be named Kokas.

General charts 942b, 2759a.

Plan of Segaar bay on 1416. Var. 2° 50′ E.

Communication.—The vessels of the Royal Netherlands Steam Packet Company, on the route from Amboina to West New Guinea, touch at Kokas in Segaar bay once every four weeks (*see* page 17). The bay is also frequented by Malay praus and Chinese traders.

Tides (*Lat. 2° 41′ S., Long. 132° 24′ E.*).—It is high water, full and change, in Segaar bay at 6h. 30m.; springs rise 6 feet, neaps 4 feet. The flood and ebb streams run at the rate of from a half to one knot an hour. In McCluer inlet the streams follow the direction of the coast.

Chart 942b, Eastern archipelago, eastern portion.

South coast of McCluer inlet.—From Segaar bay the south coast of McCluer inlet trends more and more south-eastward, and differs from the configuration shown on the chart. It has several villages on it, and is fronted by numerous islets and rocks. It is steep and about 400 feet high as far as abreast Goras village, which lies on the south side of a low islet near a projecting tongue of land, shown on the chart in long. 132° 37′ E.; inland the hills rise to a height of 1,300 to 2,000 feet. Here the coast curves gradually to the north-eastward for a total distance of 38 miles to Tanjong Tana Merah, the shore becoming low and bordered for 20 miles by an extensive bank of mud and sand, which extends 6 miles off abreast Mongoseh, decreasing afterwards in width, and which must be approached with caution. At Tanjong Ares the bank joins the shore and again increases in width to the eastward, extending off from one to 2 miles. Between Goras and Tanjong Tana Merah are numerous rivers, most of them navigable by small trading schooners. One of these rivers, the Otoweri, has an average depth of 4 fathoms for some distance up, in the rainy season, but in the dry season is nearly dry. There are numerous snags in the river. The entrance is over 1¼ cables wide, and in front of it is a bank on which the depth is 3 feet.

A shoal, with a depth of 2 fathoms, is situated 12 miles north-eastward of the point near Goras, eastward of Segaar bay, and about 10 miles off-shore.

Batu Merah islet is charted near this shoal.

A depth of 7 fathoms lies N. 58° E. about 12 miles from the east point of Arguni island.

Tanjong Tana Merah (*Lat. 2° 22′ S., Long. 133° 6′ E.*), on the south side of the entrance to the Bintuni gulf, at the head of the inlet, is a remarkable point of crumbling clay, several feet above the otherwise low coastline. Eastward of the point as far as Tanjong Ofatai the coast is fronted by a bank a mile wide. From Tanjong Ofatai the shore turns to the south-eastward as far as the mouth of the Kasuri river, and is fronted by the low wooded island of Asiar,

General chart 2759a.

between which and the main is a narrow channel, with depths of from 3 to 6 fathoms. Shoal water extends north-west and south-east of Asiar.

The Rivers Senindara and Timora discharge into the channel between Asiar island and the south shore. The first-named has a wide mouth, but narrows quickly after the first bend is passed. Traders frequent this river for dammar, which is found here. Off the mouth of the Senindara, the shore of Asiar island bends a little inward; in the basin thus formed there is good anchorage in from 5 to 6 fathoms. In the bight of Asiar is the small village of Senindara.

Both the northern and southern entrances to the channel south of Asiar are troublesome to navigate, but the channel itself is easy, provided the vessel is kept on the west side. The south entrance point of the Senindara river must be approached to a distance of from 50 to 60 yards to avoid a steep bank extending from Asiar.

Bintuni gulf.—The whole of the shores of the Bintuni gulf is formed of islands of various sizes forming the delta of the rivers, Kasuri, Ketero, Aramasa, Inseh, Sawama, and others. The gulf outside the islands has many rocks with deep channels between them, but no directions can be given for navigating it.

North side of the gulf.—Sakauni village, opposite the Kasuri river, on the south side, lies on a rivulet of the same name; it is situated on a piece of firm ground in the midst of the mud. This part of the coast is fronted by a bank, which extends 7 miles from the shore. A branch of the Wasian river (*see* below), named Timbuni, discharges westward of Sakauni; the width of the entrance is about three-quarters of a cable, but the channel to it is difficult to find, as it extends westward from the mouth, and the least depth found was 8 feet, not at low water. Many crocodiles were seen in this branch.

The Kamarin, a branch of the Timbuni, discharges westward of the latter; the channel to it is much deeper, about 4 fathoms at low water. A steamboat reached the Timbuni in 2 hours, where the depth is 4 fathoms, and at about 45 minutes steaming from this point up that river is Timbuni, the only village.

Between Sakauni and Tanjong Simir, about 13 miles eastward, the Wasian river discharges by two mouths, named the Rittuwe and Wasian; both arms were ascended by a small steam vessel to the point of junction, where the width of the river was only about 33 yards.

The eastern arm or Wasian is 1½ cables wide at the entrance; the least depth in the channel leading to it is 3 fathoms (1910), and from 6 to 8 fathoms are carried for 2 miles above the entrance, as far as the Tuwasai, a tributary on the left bank. Above the Rittuwe, the

Wasian is not navigable on account of fallen trees. The Tuwasai at its entrance is one cable wide, with a depth of from 3 to 6 fathoms; its banks are densely wooded with nipa and bakau, and are always overflowed at high water, as are those of the lower Wasian.

On the Tuwasai lies the village of that name, where the natives of the country inland meet the traders. Coal is present where the ground is dry and hard at a few miles from Tuwasai.

Tanjong Simir (*Lat. 2° 11′ S., Long. 133° 37′ E.*) is a projecting point fronted by a broad bank of sand and mud. A shoal is stated to lie about 4 miles south-west of the point, but recently the position was repeatedly passed over without any shoal being discovered.

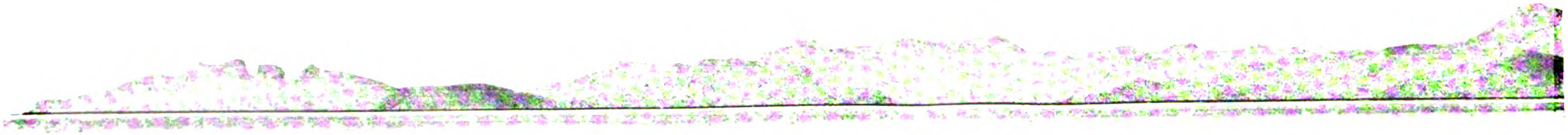
The coast eastward of Tanjong Simir, as far as the Sawama river, consists of uninhabited mud-land, covered with mangroves, and divided into islands by broad and generally deep channels. In this part several small rivers enter the gulf.

The River Sawama enters the gulf through a deep channel on the north side of a muddy bank parallel to the north shore and 8 miles in length. The two highest parts of this bank form an islet and a drying sandbank; the whole bank appears to be growing higher, and traces of mangroves were found extending about half-way across from the islet to the north shore.

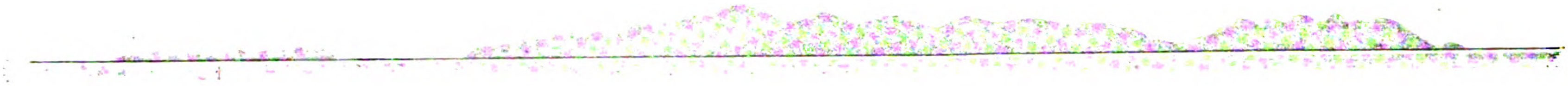
South side.—The islands Siani besar and Siani kechil lie on the eastern side of the entrance to the Kasuri river; the entrances to several other rivers lie between the mouths of the Kasuri and Ketero. Off this part of the coast are the islands, Amutu besar and Amutu kechil; the former has a large reef extending from its north-western end, and a channel on each side of the island leads to the Ketero river. Between Amutu kechil and Tanjong Gajamuar, a bank extends north-westward to a distance of about 5 miles from the shore, and between Tanjongs Atuwaipa and Gajamuar is a wide, deep, and straight river named Wagura. The north side of the entrance to the Aramasa river is low, with numerous creeks, and is covered with high timber and mangroves.

North of the Inseh river is Modan island, which in its western part is high with a cliffy coastline. The River Jakati enters the Inseh river just east of Modan island. The passage into the Jakati river north of Modan is not navigable from the gulf. The land eastward of Modan island is low as far as a mountain chain, which trends in a north and south direction.

Rivers in Bintuni gulf.—Kasuri river, which enters the sea by a broad estuary between Asiar and the Siani islands, is navigable for craft of 8 feet draught for a distance of 15 miles, and for larger vessels as far as Jaroé, 7 miles above Kasuri, at the entrance,

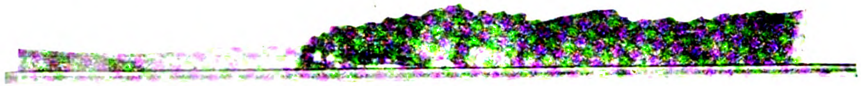


North coast of New Guinea.

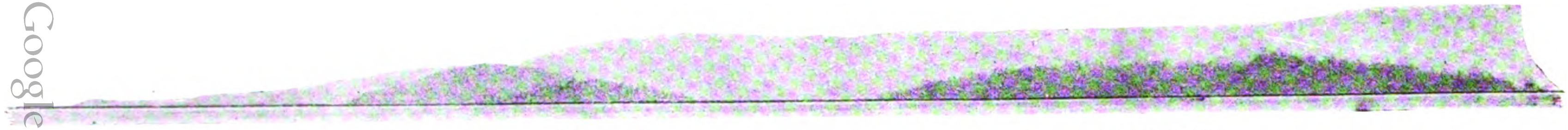

S. 70° W.
Pisang islets.
S. 85° W.
Sabuda island.
N. 60° W.

Sabuda and the Pisang islets; W. coast of New Guinea.

(c)



Batu Putih island; westward of Fak Fak.


Ekka island.
Panjang island.

West coast of New Guinea near Fak Fak.

(e)

Tumbu Tumbu
or Vogel (Bird) I.
N.W. ¼ W.
Adi island.

South-west coast of New Guinea.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

the depths varying from 3 to 8 fathoms. Kasuri is a very small village, standing partly in the water on the west bank, with a hill behind it. Jaroé village (*Lat. 2° 34′ S., Long. 133° 22′ E.*) is situated on a hill of red earth; opposite the point below Jaroé, where the river turns southward, a stream discharges by two mouths; more than 2 miles up this branch the depth decreases from 3 to 1½ fathoms.

The Kasuri river may be entered either by the channel south of Asiar, already referred to, a very narrow channel east of Asiar, or by passing between the Siani islands, through which there is a narrow, tortuous channel, with a depth of from 4 to 6 fathoms, but the first is recommended as the best, but neither of these channels should be taken without local knowledge.

Ketero river, which enters the gulf about 14 miles to the eastward of the Kasuri, is navigable for a distance of 20 miles by vessels of 8 feet draught, and for 15 miles by larger vessels. There are no villages, however, in the first 18 miles, the first being Satora, near the junction of the river of the same name with the Ketero. A depth of 3 fathoms can be carried up to Satora, which is the chief settlement on the river. The shores here are hilly and well cultivated, but lower down the river they are low and covered with vegetation.

There are numerous villages above Satora, but the river narrows and shoals, so that they can only be reached by boats.

To enter the river, the west point of Amutu kechil should be approached on a S. by E. bearing, rounding it at a distance of about three-quarters of a cable, the least water on this course being 4 fathoms. Proceeding up the river the deepest water is about a cable from the west bank, but the depth is only 3 fathoms. The river may also be approached southward of Amutu besar.

There is no passage eastward of Amutu kechil, as the bank dries right across to the mainland.

Wagura river enters the gulf between Tanjongs Atuwaipa and Gajamuar; the lower part is wide, deep, and straight. The upper Wagura has an east and west direction; the banks are alternately hilly and swampy. Side branches, navigable by small steam vessels, connect this river with the Ketero on the west and the Aramasa on the east; one of these, the Sjuga, has a bar at its junction with the Wagura, which can only be crossed at high water.

Aramasa river has depths of from 2 to 3 fathoms at its entrance, which depths can be carried up to Aredo, a small village 12 miles from the entrance, but the channel is much obstructed by banks. Above Aredo the depth in parts of the channel is only 6 feet. The bore of the river at the commencement of the flood is said sometimes to attain a height of 6 feet.

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

The Inseh and Jakati rivers enter Bintuni gulf at Modan island (*Lat. 2° 14′ S., Long. 133° 51′ E.*). The estuary south of Modan has a depth of from 5 to 8 fathoms. Depths of from 5 to 8 fathoms can be carried up the Inseh for a distance of 9 miles, and not less than 3 fathoms for a few miles further. Numerous smaller streams flow into the Inseh on both sides; one of these, on the right bank, connects with the Jakati, and has a depth of 3 fathoms, but is very narrow. The Inseh and Jakati approach each other here to a distance of half a mile.

The entrance to the Jakati river east of Modan has a depth of only from 2 to 3 fathoms, but that depth can be carried up the river for a distance of 12 miles. The river, however, is very narrow and winding and the current rapid; numerous snags obstruct the navigation.

There are very few villages on these two rivers, and none of them appear to be permanent, as the inhabitants are constantly migrating to other sites.

The channel northward of Modan island was passed through from the Jakati river, by a small steam vessel, as far as a branch on the right bank, which was followed until the Sawama river was reached.

Sawama river has a depth of only 2 fathoms in its entrance inside the mudbank previously referred to. A deeper channel has been reported, but it must be very narrow and tortuous. Deeper water can be obtained for a few miles further up, and, with the exception of one near the entrance, there do not appear to be any villages. This village lies on the left bank of the river against a wooded hill, and is barely visible from seaward behind a high rocky islet just to the westward of it.

SABUDA ISLAND (*Lat. 2° 39′ S., Long. 131° 36′ E.*), situated about 20 miles west-north-westward of Tanjong Tatingar, the southern entrance point of McCluer inlet, is 566 feet high with undulating contours, rocky, and wooded, the eastern part being lower than the west. Two rocky islets covered with vegetation lie off the north coast; Sentjan, the outer one, is 152 feet high, and lies about 3 miles north of the north-west point; Tartaruga, the inner islet, 167 feet high, lies about 2 miles south-east of Sentjan. Reefs extend from the north-west point and the north-east side of the island. Sabuda is uninhabited.

Anchorage was found on the north side of Sabuda in 35 fathoms, sand and stones, off the western conspicuous beach, with Sentjan bearing N. 44° W. and Tartaruga N. 26° E., at 2¾ cables from the shore.

The four Pisang islets lying southward of Sabuda are lower, with less even contours; the highest has an elevation of 290 feet, and

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

they appear from the southward as three large hilly islets, and a small rock, the whole covered with vegetation. View *b*, at page 288.

COAST.—Between Tanjong Kokraaf, the south-western extreme of Three Capes peninsula and Tanjong Sapei, which lies south-east 65 miles from the former, the coast forms a wide bight, in which are lesser bays fronted by islands; in appearance it is rugged and cliffy, but it has not been examined. The native name for this district is Onin.

Batu Putih (*Lat. 2° 56′ S., Long. 131° 57′ E.*), an island lying southward of Tanjong Kokraaf, is about 2 miles long east-south-east and west-north-west, rocky, wooded, and 458 feet high. Reefs extend a considerable distance off its north and east sides. It may be distinguished from the mainland by some remarkable white patches on the east, west, and south sides. View *c*, at page 288.

Anchorage may be obtained on the north side of the island, but no depth is given. The flood stream here sets westward. At full moon it was low water at about 6h., and the range was 8 feet.

Togarwatan and Sipatnanam bays lie immediately eastward of Tanjong Kokraaf and westward of Tanjong Ributtutin. They are each about 2 miles wide, and are separated by a thickly-wooded peninsula, on the east side of which is a cascade of fresh water. In the latter bay the depth of water at the anchorage is 2½ to 5 fathoms, and in the middle of the anchorage there is a shoal about a third of a mile from the shore.

Plan of Fak Fak and Acha Tuning roads on 1416.

Ekka island, or Egga, about 2½ miles long east and west, is narrow, rocky, and wooded, with a white beach, and lies about 8 miles south-eastward of Tanjong Kokraaf and one mile off-shore. The island has numerous remarkable white patches on it. A rocky shoal extends about 2½ cables from the east point of Ekka; between the island and the mainland there are several small, low, wooded, and uninhabited islets, named Tipporra islets, standing on an extensive shoal.

There is a narrow deep channel between Ekka and the reef surrounding the Tipporra islets; vessels should keep close to Ekka when using it.

Panjang island, lying 1$\frac{4}{10}$ miles eastward of Ekka island, with a deep channel between, is narrow, and 9½ miles in length east and west. A narrow ridge of hills runs along its whole length. Reefs extend 2 cables from the west and 3 cables from the east end of the island. View *d*, at page 288.

General charts 942b, 2759a.

Plan of Fak Fak and Acha Tuning roads on 1416. Var. 3° E.

LIGHT (*Lat. 2° 58′ S., Long. 132° 17′ E.*).—A *white group occulting* light showing three eclipses *every thirty seconds*, thus:—light, *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds*, is exhibited at an elevation of 105 feet above high water, from a white iron framework, 42 feet high, situated on Tanjong Wamarusa, the eastern end of Panjang island, and is visible in clear weather from a distance of 16 miles. For arc of visibility, *see* Light list and plan.

Charts 942b, 1416.

Dangers.—Five reefs lie southward of the eastern part of Panjang island. Egeron reef, the southernmost of these, has one fathom least water, and is about half a mile long by one cable wide; it lies S. 2° E. 7½ miles from the east point of Panjang. The other reefs have from 1½ to 2½ fathoms on them, and lie with the east point of Panjang between the bearings of N. 15° E. and N. 23° E., and extend to within 1½ miles of Egeron reef, as charted.

Plan of Fak Fak and Acha Tuning roads on 1416.

Acha Tuning (Atti Atti Onin) is a Ceramese village on the mainland opposite to the west end of Panjang island; the village consists of some eleven houses and a mosque, all built in shallow water on the left bank of a river, and has a decayed appearance. The anchorage off Acha Tuning appears to be indifferent, and in deep water. A reef extends to the distance of about one mile eastward from the point situated westward of the roadstead. From the anchorage in 32 fathoms, mud and stony ground, the mosque bears N. 41° W., and the east point of Ekka island S. 39° W. At Acha Tuning there is a freshwater stream, eastward of the bay.

Werba bay, about 2½ miles eastward of Acha Tuning, has anchorage in 13 fathoms, mud, with the east entrance point of the bay bearing S. 65° E. and the west point S. 8° W. A N.W. by N. course leads up the middle of the entrance; a lookout should be kept for reefs on each side. Good drinking water may be had from the stream in the north-east corner of the bay.

Several villages lie along the coast between Acha Tuning and Fak Fak; the houses stand on piles on the beach and in the water, the latter being connected with the shore by light bridges of bamboo. The coast is bordered by a wide bank of coral, except in front of the streams.

Danger.—About 7 miles eastward of Acha Tuning, distant nearly half a mile from the coast, there lies a small reef, with a least depth over it of 2 feet, from which Fak Fak flagstaff bears N. 75° E., distant 2$\frac{1}{10}$ miles.

Fak Fak (*Lat. 2° 54′ S., Long. 132° 16′ E.*), a village of some importance situated 9 miles eastward of Acha Tuning, and nearly

General charts 942b, 2759a.

abreast of the east end of Panjang, is built against and upon a plateau 345 feet high on a point of the same name, and can be recognised by the flagstaff. It is situated on the west side of a small bay with nearly vertical sides, which extends about half a mile northward but is only from three-quarters to one cable in width, with a depth of 5 fathoms near the entrance, and is an excellent place for small craft to lie; the landing is at a small pier in the inner bay, from whence a path to the village is cut in the rocks. The Fak Fak river enters the head of the inner bay, but usually the bed is dry to within half a mile of the mouth, with pools here and there, but not fit for drinking. This water can be obtained by going up the river on the flood tide.

At this place, within the district of Kapaur, and belonging to the Ternate Residency, is the seat of the Assistant resident of the West New Guinea division. Nutmegs are exported.

Tubi Serang island, 1½ miles south-east of Fak Fak, is wooded, partly with nutmeg trees, and is surrounded by the shore reef which, at this part, projects out to the distance of 8 cables.

Danger.—Beacon.—Metti Metti reef, lying about a mile south-westward of Fak Fak, is about half a mile long north and south, narrow and steep-to. It dries over a great part at low water, and its southern end is marked by a white beacon with rectangular topmark. There is a deep passage between the reef and the shore.

Road (*Lat. 2° 55′ S., Long. 132° 16′ E.*).—The limits of Fak Fak road are the meridians of Metti Metti reef and Tubi Serang island, 1½ miles apart, and the parallel of that island. There is anchorage in the road at from 3 to 4 cables from the shore in from 28 to 32 fathoms; care must be taken when anchoring not to open the east end of Ekka clear of the west end of Panjang island.

The shore reef extends off about 1¾ cables.

Directions.—From the westward, pass southward of Batu Putih (page 291), and between Ekka and Panjang islands; then steer eastward between Panjang and the shore until a white patch on the cliff eastward of Fak Fak river bears N. by E., when steer for it, and when nearing the road steer for the flagstaff and anchor as requisite. *See* Road, above.

Vessels from the westward may also pass northward of Batu Putih and Ekka; keep in mid-channel between Batu Putih and the shore, and round the eastern point of the island at a distance of about one mile. Pass along the north side of Ekka at a distance of about 80 yards, and avoid the reef at the east end of the island which

Plan of Fak Fak and Acha Tuning roads on 1416. Var. 3° E.

extends northward a little; then steer between Panjang island and the shore, as before directed.

From the southward, the high land of Kumawa will be visible on a clear night, and farther northward Karas, Otar, and Panjang islands are good marks. When Panjang light is sighted, do not bring it to bear northward of N. by W. ½ W., and steer a northerly course with the light on the port bow; pass it at a distance of at least half a mile, and steer southward of Tubi Serang island to the road.

Communication.—Vessels of the Royal Netherlands Steam Packet Company call at Fak Fak once a month. *See* page 17.

Coal may be obtained from the Government coal sheds. The amount kept in stock is not stated.

Coast.—Eastward of Fak Fak are several villages on the coast. Farther east is a bight filled with sand, named Wodaar bay, into which four fresh-water streams flow; boats can ascend two of these for half a mile; the others are creeks between the mangroves. There are numerous houses on piles in Wodaar bay, with a population of about 200. The bight is surrounded by high hills covered with nutmeg trees.

Chart 942b, Eastern archipelago, eastern portion.

Tanjong Tariman (*Lat. 3° 1′ S., Long. 132° 26′ E.*), 11 miles south-eastward of Fak Fak, is a high point, off which a reef is reported to lie at a distance of 1½ miles from the shore.

Tanjong Patimuni, 26 miles south-east of Fak Fak, is high and bordered by reef; a reef with less than one fathom over it lies about 3 miles west of the point.

Weri bay.—On the north side of Tanjong Patimuni the coast bends eastward, and forms a large bight named Weri bay, from a rivulet of that name that flows into it. Good anchorage may be found in this bay in the south-east monsoon. On the shores are five settlements with a total population of about 250.

The largest village, Woresar, lies not far eastward of Tanjong Patimuni, and is built on a narrow, stony beach, with a steep hill behind it. There is a fresh-water spring here, which gives abundance of water, even in the dry season. There is anchorage off the village close to the shore in 27 fathoms.

Charles Albert archipelago is the name given to the islands near Tanjong Patimuni.

Samei, the northernmost, lies 7 miles north-west of Tanjong Patimuni, and comprises two islands, Otar and Urat, with a passage

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

between them. The country eastward of these islands is named Samei. Otar is tolerably large, and is of limestone formation, covered with a thick layer of clayey soil. There are two small Papuan settlements on the island.

Plan of Karas island anchorage on 1416.

Karas Kani (Gudin) island (*Lat. 3° 28′ S., Long. 132° 40′ E.*) lies 13 miles southward of Tanjong Patimuni; it is 8 miles long north-west and south-east, 1,200 feet high, with a hill at each end, and at a distance appears as two islands. Eastward of it are two islets, Tuburuasa and Batur (Fauer), the channel between them and Karas having depths of from 25 to 45 fathoms, the deep water running close to the shores nearly everywhere.

On Karas there are two villages, on Tuburuasa three, and on Batur three. The chief of Maas village, with the title of Major, has a certain authority over the group. The inhabitants collect trepang and shells, and trade with the mainland opposite; they are partially civilised and are Mohammedans.

Anchorage.—There is anchorage in from 30 to 40 fathoms off Maas village at the south-end of Karas island; closer in, the cable is liable to foul the coral, which may prevent its being hove in.

There is also anchorage off Kioba and Martupi villages on the east side of Batur island, in 20 fathoms, hard sand. To reach this anchorage steer northward along Karas Kani and then between Tuburuasa and Batur, where there are no dangers in mid-channel.

A reef with a depth of 4 fathoms is charted 5 miles north-west of the north-west extreme of Karas Kani, with Tanjong Patimuni bearing N. ¾ E., distant 10½ miles.

Chart 942b, Eastern archipelago, eastern portion.

Sebakor (Suwak) bay, lying between Karas Kani island and Tanjong Sapei, is full of reefs, and the shores are low. Kulkadi village lies on the shore eastward of the south point of Karas Kani; traders from Fak Fak come here for trepang, shells, and birds.

The country behind the bay is flat, and communication is made by means of rivers and footpaths with Karufa, situated in the bay northward of Adi island.

Tanjong Sapei or Baik (*Lat. 3° 42′ S., Long. 132° 41′ E.*) is the north-west point of Orange Nassau peninsula (Kumawa). From Tanjong Sapei the coast trends south-south-eastward for 28 miles to Tanjong Katumin, the south-west point of the peninsula; the land between the points reaches a height of 3,000 to 4,000 feet near the shore, but the peaks are usually hidden in clouds. Some islands are shown near the shore midway between the two points.

General charts 942b, 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

The coast of Kumawa is uninhabited; wild pigs, kangaroos, &c., abound.

Northward of Cape Bosch a peninsula projects, forming a bay on each side, the northern named Senggala and the southern Wap, bay.

Senggala bay is about 4 miles deep; the west side is strewn with reefs, but the east side is clear. There are two waterfalls less than a cable apart; the southern one affords good drinking water. There is anchorage in 20 fathoms, coral bottom, with a small islet to the northward bearing N.W. by N.; this bay is to be preferred in the south-east monsoon.

Wap bay has steep sides and deep water. Anchorage in 30 fathoms was found close to the shore.

SOUTH-WEST COAST.—Tanjong Katumin (*Lat. 4° 7′ S., Long. 132° 55′ E.*) is a high bold headland composed of limestone.

Nusa Wulan or Ruloff islands are three small high islets lying south-east of the cape. The southernmost and largest is clean on the east side, but on the west side a large reef extends; on the north side is a small village. Northward of this island lies the second, connected with the shore by a drying reef; and west-north-westward of this is the third, properly a high peninsula which appears like an island, from the south side of which a reef extends. In the passage north of the largest island the depth is 9 fathoms in mid-channel. Eastward of this passage a small river discharges, off which there is anchorage in about 13 fathoms. The stream is brackish.

Derdi islets, lying about 7 miles east-north-eastward of Nusa Wulan, are rocks covered with vegetation. They may be closely approached on the south and east sides, but there is a reef on the north-west side that dries. Southward of these islets and just within the 100-fathoms line is a shoal with 5½ fathoms on it, from which Nusa Wulan bears S. 81° W.

At about 19 miles eastward of Nusa Wulan is a point of land named Tanjong Usau; a reef lies half a mile south-west of the point.

Plan of Wardenburg group on 1416.

ADI ISLAND, with its north-west extreme situated 27 miles east of Tanjong Katumin, is 28 miles long west-north-west and east-south-east; it is of coral formation, and only 50 feet high in the centre. The island has more inhabitants on the north side than on the south. On the north side are several villages, the principal of which is Mangawitu.

Dangers.—Several shoals and sunken reefs lie north-east of Adi to a distance of 6 miles from the shore. From Tanjong Kainara, the

General charts 942b, 2759a.

Plan of Wardenburg group on 1416. Var. 3° E.

north-western extreme of the island, a sandbank, dry at low water, extends in an easterly direction, and sunken reefs continue in the same direction, the easternmost, which partly dries, lying 8 miles S. 13° E. from Karawatu; a projection from these reefs has 2¼ fathoms on its western point at 8¼ cables E.N.E. from Tanjong Kainara. Two patches of the sandbank are said to be always above water.

A reef with a depth of 2 fathoms, marked by discoloration, is situated 3⅝ miles N. 82° E. from Tanjong Kainara. A coral rock about one cable in extent, with a least depth of 1¼ fathoms over it, lies with the east extreme of Adi bearing S.S.E. ¼ E., distant 9 miles.

The south coast of Adi can be approached to within 2 or 3 miles. Tumbu Tumbu, or Vogel (Bird) islet, lies about 5 miles south of Adi and about 10 miles from its east point; it is small and low, and turtle are found there. The island is encircled by a reef, and there are several small detached reefs around it. There is a good passage between Tumbu Tumbu and Adi. View *e*, at page 288.

Anchorage.—Off the middle part of the north-east side of the island the plan shows anchorage in a depth of 6 to 10 fathoms, mud, at the distance of 1½ miles from the shore. If bound to Mangawitu, in order to avoid the reefs northward of Adi, bring Keliwala islet to bear N. 3° W., and keep it so astern until past the reefs, when Mangawitu should be steered for and anchorage taken up in not less than 12 fathoms, as the depths rapidly decrease. About 5 miles to the southward of the western point of Adi there is a small bay affording anchorage in a depth of 10 or 11 fathoms.

Nautilus strait, separating Adi island from the main shore, is 5 miles in width, with depths of 8 to 10 fathoms in it. Off the northern entrance of the channel are the islets of Urobi (*Lat. 4° 2′ S., Long. 133° 24′ E.*), Unaga and a rock above water, lying S. 20° W. from the latter; Simla reef lies westward of Unaga. Between the north point of Adi and Urobi islet the channel is only 2½ miles wide. When proceeding through the strait keep in mid-channel, passing about one mile off the north-west point of Adi, where depths of from 12 to 21 fathoms are found.

Charts 1416, 942b.

Kamrau bay (Arguni) is an extensive indentation in the coast north of Adi island. In the northern part of Kamrau bay, various rivers discharge their waters, of which the Ombwallar, which comes from the westward, is the principal; in the upper reaches of this, one finds a network of passages, some of which are as much as about 900 yards broad and partially navigable for vessels of 12 feet draught.

General charts 942b, 2759a.

Charts 1416, 942b. Var. 3° E.

The land here is flat, and covered with vegetation, with some hills, steep-to, here and there, at the water side. There are several islets in this part of the bay, the northernmost being the Serote islets, consisting of one large rocky islet and two smaller ones southward of it, connected by a reef, partly dry at low water, which extends 1½ cables eastward of the central one; at some distance southward of the southern islet are some rocks. The shore of this bay is also indented with numerous smaller bays, and near its centre lie two small islets, Karawatu and Keliwala, on a bank of from 3½ to 4½ fathoms; the south side of Keliwala, the north-eastern islet, must be rounded at a distance of more than 1½ miles, as an extensive reef projects southward and eastward from the islet. There is a village on the south-west point of Keliwala, and also on the north point of Karawatu. Vessels bound to Nautilus strait should pass southward of these islands; the channel northward is dangerous.

Dangers.—The four following dangers are given with their bearing and distance from Keliwala islet:—

A shoal, with 3 fathoms on it, N. 40° W., 4 miles.

A reef, with 2 fathoms on it, N. 40° W., 2 miles.

A reef, that dries, N. 50° W., 2½ miles.

A depth of 6 fathoms, marked by discoloured water, lies north-east 5½ miles from Keliwala.

Reefs appear to extend for 4 or 5 miles off the western shore of Kamrau bay, with three pointed islets on them, named Mustiko (Nustiga).

A reef, with 1½ fathoms on it, lies in the north part of Kamrau bay, about 2 miles south of the enfrance to Arguni bay.

A shoal, with a least depth of 3¾ fathoms on it, lies S.S.W. distant 3 miles from Tanjong Semora, on the western side of entrance to Kaimana bay.

Karufa river (*Lat. 3° 49′ S., Long. 132° 34′ E.*).—The River Karufa, or Tenggiri, debouches on the western shore, through five mouths, only one of which can be used by vessels. The Netherlands war-vessel *Etna* entered this river in 1858 through a channel in which the depth was 2½ fathoms, with 2 fathoms on the bar, and within the mouth there was anchorage in 11 fathoms. For some distance the width of the river is about 7 cables, after which it becomes narrower. The banks are low, and are overflowed in parts during floods. The depth in the broad part of the river is from 2½ to 3 fathoms; higher up it varies from one to 5 fathoms. Outside the entrance the depths decrease gradually inwards from 3 fathoms.

Caution.—The plan of Wardenburg group on 1416 must be used with the greatest caution.

General charts 942b, 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

Arguni bay, the entrance to which is at the head of Kamrau bay, consists of four inner bays, which, with the passages between them, extend about 30 miles northward; numerous islets are charted in Arguni bay. The shores of the first two bays are high, and the passages between them and between the second and third have cliff walls. The east side of the third bay is steep, but the west shore is low. Eastward of Arguni bay are several high mountains, the southern of which, Mount Genoffo, is 4,921 feet high; the northern is Mount Nyurdamis, and spurs from these mountains come down to the bay. Bekorrat, on the east side of the first bay, consists of one house on the shore, and Berari, on the east side of the third bay, is one house on high piles. Tefara village stands in the water on the east side of the fourth bay.

In the north-western corner of Arguni bay a river discharges, the water of which is fresh a short distance up. By means of this river and a path through the forest, connection is made with tributaries of the Ketero and Wagura rivers flowing into McCluer inlet. The southern entrance to the first inner bay is about 2 cables wide; on the east side a reef, dry at low water, extends one cable from the shore opposite the island on the west side of the entrance. Within the first bay, at about one-third of its width from the eastern side, is a reef partly above high water; farther northward on the west side and about opposite a white rock is an islet from which a reef, partly dry at low water, extends north-north-east, and in the entrance to the second bay is a reef partly dry at low water, the best channel being eastward of it. Otherwise the first two bays are deep, with 8 fathoms in places; the third has a 3-fathoms channel running the length of the bay, with shoal water on either side, and in the fourth bay the depth soon decreases to 2 fathoms, with shoaler water towards the shores. For the reef southward of the entrance to Arguni bay, *see* Kamrau bay.

Plan of Kaimana bay on 1416.

Kaimana bay (*Lat. 3° 43′ S., Long. 133° 43′ E.*) lies eastward of Tanjong Semora on the eastern side of Kamrau bay. It is a wide bight which extends northward about 2 miles, and is bordered by wide reefs, between which is a space of about one mile in width and 1½ miles in length in a north-east and opposite direction, with general depths of from 5 to 10 fathoms. The reef off Tanjong Semora extends farther than is shown on the plan. In the north-west part of the bay a river discharges, which has a greatest width of one cable, and divides into two branches at about a mile from the entrance. The banks are covered with mangroves, and the water is foul and muddy. A steamboat can ascend the river at low water for 3 miles by keeping

General charts 942b, 2759a.

Plan of Kaimana bay on 1416. Var. 3° 10′ E.

on the left bank, but there are numerous obstructions. There is little current in the river; the flood was perceptible far up.

Kaimana village lies on the east side of the bay; there is a high white mosque visible 10 miles off in clear weather, and on the beach, which is separated from the high land behind by some swampy ground, are the houses of the rajah and some traders, also a store belonging to the Netherlands New Guinea Trading Company. Kaimana is the trade centre of the Kowiai district, the rajah of which lives at Namatotte.

Off the village there is good anchorage, which is rendered safe in southerly winds by the reef to the southward of the village, which extends some distance from the shore, but not as far as is shown on the plan. The depths at the anchorage decrease regularly to the sloping sand-beach. The bank on the west side of the bay is easily approached by the lead.

In the approach to Kaimana, eastward of Keliwala, five shoals were found on which the depths varied from 3½ to 6¾ fathoms; no discoloured water was seen over them. This part nevertheless has a very even bottom, with depths that gradually increase from the west to 28 fathoms near Namatotte.

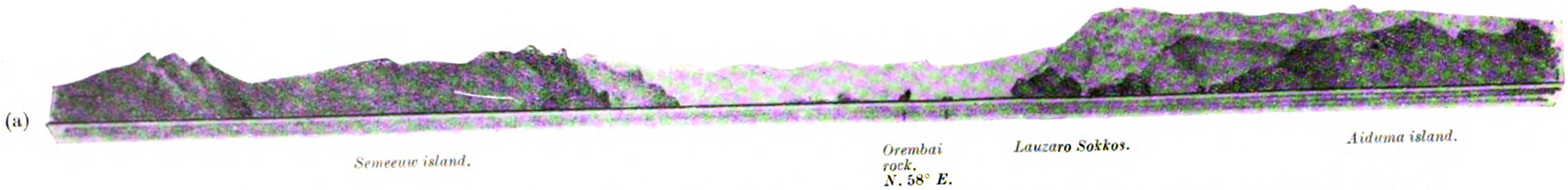
Chart 942b, Eastern archipelago, eastern portion.

Telok Bitsjaru (*Lat. 3° 43′ S., Long. 133° 50′ E.*), lying eastward of Kaimana bay, penetrates about 8 miles northward. The shores rise steeply from the sea nearly everywhere, but here and there are very narrow sand-beaches. In the north-west, at the head of the bay, the mountain chain is interrupted by swampy ground, through which a river flows into the bay. Some reefs lie half a mile from the eastern shore, about half-way up the bay; no other dangers were found.

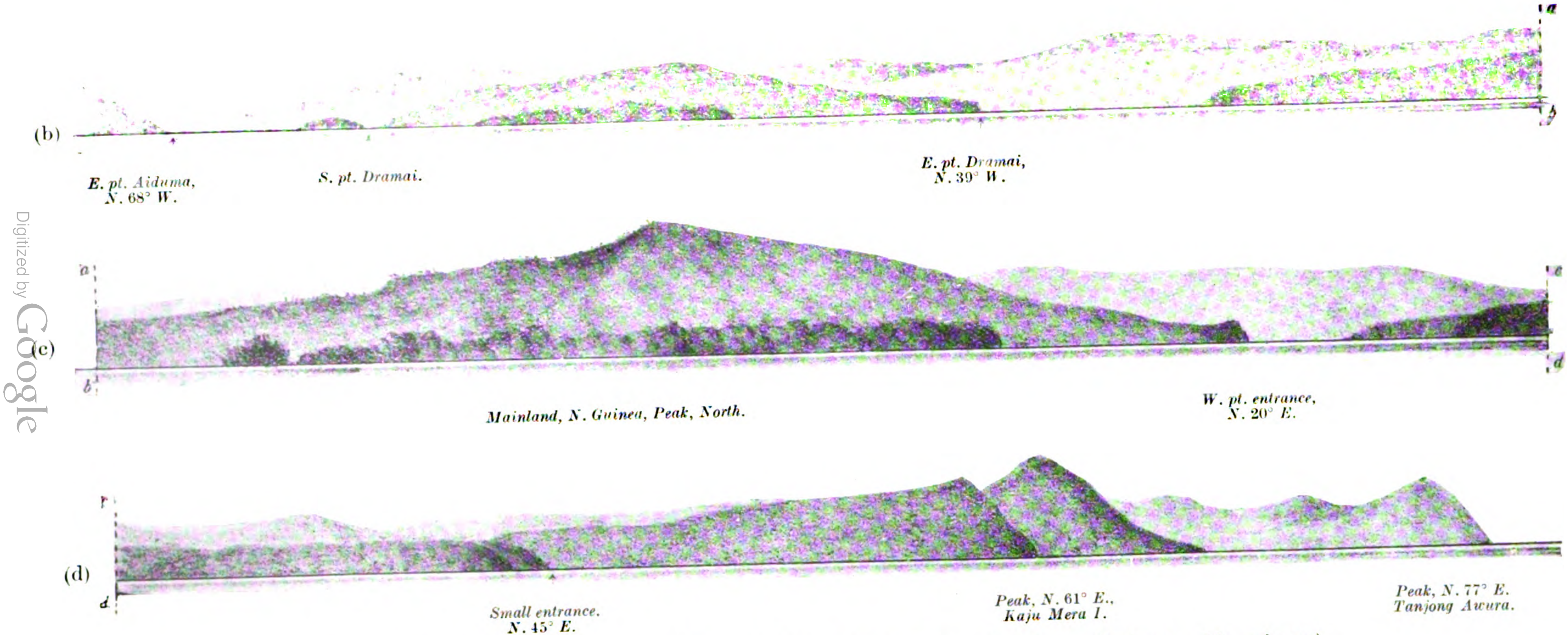
Namatotte island, lying parallel with the shore south of Telok Bitsjaru, is about 10 miles long north and south, narrow, and consists of a ridge of hills about 985 feet in height, which descend steeply to the sea nearly everywhere.

In Java bay, near the south end, there is anchorage in 10 fathoms at 1½ cables from the shore. Namatotte village, where the rajah of the Kowiai district resides, is situated on Java bay.

The strait separating Namatotte from the mainland has very steep shores, indented by several inlets, the largest of which is Raaf bay, with depths of from 7 to 10 fathoms. No dangers were found in the centre of the strait, and the reefs on the west side were well marked by discoloured water.


(a)
Semeeuw island.
Orembai rock, N. 58° E.
Lauzaro Sokkos.
Aiduma island.

Entrance to Uru Languru or Triton bay, about 8 miles distant; S.W. coast of New Guinea.


(b)
a
b
E. pt. Aiduma, N. 68° W.
S. pt. Dramai.
E. pt. Dramai, N. 39° W.
(c)
a
b
c
d
Mainland, N. Guinea, Peak, North.
W. pt. entrance, N. 20° E.
(d)
d
Small entrance. N. 45° E.
Peak, N. 61° E., Kaju Mera I.
Peak, N. 77° E. Tanjong Awura.

Approach to Kaju Mera bay, south-west coast of New Guinea (3 views).

Chart 942b, Eastern archipelago, eastern portion. Var. 3° 10′ E.

Uru Languru or Triton bay is an inlet extending 9 miles north-eastward into the mainland, having two islands on the north side of the entrance, and several islets farther in. The shores are mountainous. A chain of three small islands and three rocks above water stretches westward from the west point of Aiduma, and the fairway channel lies between the outermost of these and Semeeuw islands, 3 miles to the north, and to the westward of the islets lying farther inward. View *a*, at page 300.

Plan of Dubus haven on 1416.

Dubus haven is a cove on the north side of Triton bay, which is 2 miles deep to the north-west, and with half a mile navigable width, having at the entrance a depth of 25 fathoms, which decreases to 5 fathoms, mud and clay, at its head, where a vessel may moor in from 7 to 10 fathoms about 3 cables from the shore off the ruins of an old Dutch fort, in front of which an old stone pier, for a great part buried under the sand, is reported to extend about 50 yards. The channel into the cove is close to the south-west side, as a shallow bank of clay, mixed with sand in places, extends from the north-east side, three-fourths of the width of the cove.

At the head of the cove is Mount Lamansiere, 2,460 feet high, with a narrow, level, alluvial strip of land between it and the coast, which, at the mouth of the Tombona river, becomes mangrove swamp. The Tombona flows into the north side of the cove in the centre of the bank just mentioned. Good fresh water can be obtained from the river at low tide. The place is unhealthy. Lobo, a small village, lies at the foot of Mount Lamansiere.

North-eastward, about 3 miles from Triton bay, is a large lake.

Tides.—It is high water, full and change, in the cove in Triton bay at 1h. 8m.; rise at springs, 7 feet; the greatest rise is at the quarters, when the range is nearly 8 feet. There are two high and two low tides in the 24 hours. Little stream was observed in the bay, especially in Dubus haven.

Chart 942b, Eastern archipelago, eastern portion.

Aiduma island (*Lat. 4° 0′ S., Long. 134° 7′ E.*), on the eastern side of the entrance to Uru Languru, is 9 miles long west-north-west and east-south-east, high and steep-to, especially on the south side, where, at a distance of 2 miles from the shore, there is no bottom at 100 fathoms; from the western point, as stated above, a chain of islets and rocks extends 5 miles to the westward, and at one mile west of the north point are three steep-to rocks close together. Dramai island, off the east end of Aiduma, in the entrance to Iris strait, is high and partly cultivated; the north-west point is low.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° 10′ E.
There is anchorage in a bight on the north-east side of Aiduma, in a depth of 25 fathoms at a cable's length from the shore, and opposite a fertile valley, in which there is a native village; also off Aiduma village, near the west point of the island, in 23 fathoms, with the village bearing S. 63° E.

Iris strait is between Aiduma island to the south, and Dramai island and the mainland of New Guinea to the north. The strait is, generally speaking, from one to 2 miles wide, but is contracted to less at both ends. There were no soundings in mid-channel with from 80 to 90 fathoms of line. The channel between Dramai and New Guinea is one mile wide in the narrowest part, with some small steep islets in it abreast the middle of Dramai; it is deep, and no dangers were seen, but the shore reef a short distance southward of the north-west point of Dramai projects somewhat. Mankawu river discharges in the north part of the strait, on the New Guinea side.

The tidal streams in the strait are generally strong, but the velocity depends greatly on the force of the wind. A mean range of tide of 7 feet was observed here.

Plan of Kaju Mera and Lukahia bays on 1416.

Kaju Mera island and bay.—Kaju Mera island, about 4 miles long east and west, and 1,664 feet high, lies nearly 7 miles eastward of Aiduma; islets stretch out from its north-west and south-west points leaving a narrow deep channel close along the mainland into Kaju Mera bay. The channel westward of Saraura island is about 1¼ cables wide, while that to the eastward of that island is less than half that width. Eastward of Kaju Mera island, the passage to the bay, 1½ miles in width, and which is also deep, has three small steep-to islets in the centre of it. Views *b*, *c*, *d*, at page 300.

Kaju Mera bay (*Lat. 3° 56′ S., Long. 134° 21′ E.*), about 6 miles in length east and west, and 3 miles deep, appears to be clean except for the dangers mentioned below and for the fringing banks of mud and sand, which in places extend out to the distance of half a mile; but a reef projects nearly a mile south-eastward from a small peninsula at the north-west end of the bay.

The eastern shore of the bay is swampy and intersected by several small streams; the western part of the northern shore is high. The Airawoi river discharges into the north-west corner of the bay; the bank in front of the river entrance dries at very low water. The peninsula forming the west side of the bay terminates in steep rocks, but on the north and south sides are level parts with cocoanut trees; on the north side is a spring, which yields a constant supply of fresh water. On the south side of this peninsula is an inlet extending nearly 4 miles north-westward; the depths are reported to be much greater than those shown on the plan, there being no bottom at 25 fathoms, where depths of 6 and 9 fathoms are shown. H.N.M.S. *Koetie* anchored about one mile north-west of Tanjong Wanguru in 22 fathoms, close to the shore, off a small sand-beach with cocoanut trees on it. At the head of the inlet is a small creek, with fresh but muddy water. Some islets lie north-westward of Kaju Mera island, connected with it by a reef; the north-western is called Nasir; Mondan consists of two hills joined by a narrow strip of sand. The chief of Kaju Mera lives at Timboka village, situated on a white sand beach with cocoanut trees, about one mile north-west of Tanjong Wandala.

Dangers.—A rock 220 yards in diameter, covered by 1½ fathoms, with 17 to 20 fathoms around, lies N. 29° W. 3$\frac{9}{10}$ miles from the east point of Kaju Mera island; a rock 110 yards in diameter, with 5 fathoms on it and 16 to 21 fathoms around, lies 3 miles N. 27° W. from the same point; and a rock 330 yards in diameter, that dries, lies 4½ miles N. 19° W. from the same point and 330 yards from the shore, with a depth of 8 fathoms in the channel between.

Anchorage may be found in depths of from 10 to 20 fathoms, mud or sand, along the shores of Kaju Mera bay, at a moderate distance from the fringing bank.

Lakahia bay and **Etna** or **Kiruru bay.**—Lakahia bay has its entrance between Tanjong Awura (*Lat. 4° 1′ S., Long. 134° 27′ E.*) and Tanjong Bohia 8 miles to the east-south-east; a reef extends westward 2½ miles and south-westward 3 miles from the latter point. Three miles north-westward of Tanjong Bohia is Lakahia island, 1¼ miles long north-east and south-west, surrounded by a reef, which, spreading out to the breadth of one mile, extends for that distance south-westward; the island is low and wooded, the top of the highest tree being 221 feet above the sea. The bay first trends 11 miles to the north-east, and then turns sharply to the eastward for a further 17 miles; this inner extension is known as Etna or Kiruru bay.

The north-western side of Lakahia bay is high, with some bays; the eastern side is low land, covered with mangroves, and intersected by creeks. Tanjong Bohia, the eastern entrance point, has a small hill near it, 276 feet high; a bank, with depths of from one to 3 fathoms, extends 2½ miles westward and 3 miles south-westward from the cape. Tanjong Tarella, about 8 miles north-eastward of Tanjong Bohia, is a sandbank above low water, covered with trees; westward of it is a long, narrow, drying shoal.

The eastern side of Lakahia bay is in great measure occupied with an extensive bank covered by one to 3 fathoms water; the channel to Etna or Kiruru bay lies close along the western shore, and is about

Plan of Kaju Mera and Lakahia bays on 1416. Var. 3° 10′ E.

half a mile wide, off Tanjongs Etaburi and Wariwi, with a depth of from 3½ to 22 fathoms. Tanjong Etaburi is surrounded by a narrow reef, outside which, at half a cable from the shore, is a rock that dries, and at about 1¾ cables from the shore is a rock with 3 feet on it, from which Tanjong Tarella bears N. 70° E. At 3¾ cables east-north-east from the islet off Tanjong Wariwi the depth is 2¾ fathoms on the south end of a bank on which the least depth is 1¾ fathoms. A patch of 2¾ fathoms lies westward of the south end of this bank.

Between the shoal forming the eastern side of the above channel and the eastern side of the bay, is another channel, with a depth of over 5 fathoms, steep on the east side, but not on the west, which can be approached by the lead. It is entered from the channel under the west shore, over a 4-fathoms bar abreast Tanjong Etaburi. On the south side of the bar the depth is 2¾ fathoms.

Anchorage.—There is anchorage in Lakahia bay about half a mile northward of Lakahia island in a depth of 7 to 10 fathoms.

Small vessels can anchor northward of Tanjong Wariwi, in from 5 to 6 fathoms, about half a cable from the shore reef, between the 2¾-fathoms patch and the point. Vessels lie quietly here in the north-west monsoon, when there is much swell in the bay, and the high point offers good shelter from the wind; this anchorage is not so safe in the south-east monsoon.

Etna or **Kiruru** bay (*Lat. 3° 54′ S., Long. 134° 40′ E.*) is narrow, land-locked, and entered from Lakahia bay between Tanjongs Itewi and Bawia, two steep projections of the coast; the western of these, Tanjong Itewi, is steep-to, but on the eastern side a row of drying rocks extends nearly a cable from the shore between Tanjongs Ulupala and Bawia. Immediately outside the outer rock the depth is 4 fathoms. A drying sandbank lies off Tanjong Ulupala. The north side of the bay is mountainous, the highest point, Bamana Gebirge, about 3 miles north-east of the entrance, having an elevation of 4,498 feet; the shore is not steep everywhere, but alternates with mud land covered with mangroves. The south side is like the north, but here the mountains are in detached groups; the coast is thus more open, which has a perceptible effect on the weather conditions. In the western part of the bay, northward of the west entrance point, is a waterfall which falls gradually, with some bends, from a height of about 690 feet. There are no rivers, but at the head of the bay a small stream affords fresh water.

The depths in the bay vary considerably, the narrowest parts being the deepest; southward of Mount Puran (1,137 feet) and northward of Seriwi Gebirge (1,592 feet), where the bay is only half a mile

General charts 942b, 2759a.

Plan of Kaju Mera and Lakahia bays on 1416. Var. 3° 10′ E.

wide, the depths are 26 and 16 fathoms, respectively. In the broader parts there are from 6 to 10 fathoms. The eastern part of the bay is shoal, but a channel with more than 5 fathoms extends to within 5½ miles of the head, and 3 fathoms can be carried 3 miles farther.

Shoals.—A patch of 4 fathoms lies about 3 cables north-east of Tanjong Itewi (*Lat. 3° 55′ S., Long. 134° 37′ E.*), on the west side of the entrance.

On the north side of the bay, just westward of a projecting point 4 miles eastward of the entrance, is a shoal under the coast one mile in length, with a least depth of 3 feet, the outer edge being about 3 cables from the shore.

In the broad part north of Tanjong Jaramabonga are two narrow banks of mud and sand, with least depths of 2 and 2½ fathoms, respectively, and 8 cables east of the northern of these is a patch of 3 fathoms at 1½ cables from the north shore.

Northward of Seriwi Gebirge, in the middle of the narrow channel, is a steep-to reef that partly dries; the deepest channel is southward of it, and should be used.

About 6 miles eastward of Tanjong Jaramabonga the coast turns sharply southward, and westward of the point thus formed a bank of less than 3 fathoms extends 4 cables from the shore over a length of more than one mile.

Anchorage.—There is anchorage throughout the length of Etna bay in a moderate depth of water; it is not, however, desirable to anchor in the narrow parts of the bay, nor in the bight at the west end north of Tanjong Itewi, on account of the whirls and bad holding ground.

The district, including Kiruru and Uru Languru, is known as Kowiai.

Caution.—The coast, islands, and reefs between Tanjong Sapei and Lakahia bay are reported to be very incorrectly charted, and many of them are several miles out of position. Caution is necessary when navigating near this coast.

Directions.—When approaching Lakahia bay from the southward, Mount Buru near Tanjong Nariki (*Lat. 4° 12′ S., Long. 134° 45′ E.*) to the eastward is a good mark, as it stands quite apart and close to the coast; the hill near Tanjong Bohia and Lakahia island also serve to point out the entrance to the bay. This point and island must be given a good berth, and a N.N.E. ½ E. course shaped for Tanjong Etaburi, which should be rounded at a distance of nearly a quarter of a mile, and the course then shaped for Tanjong Wariwi, passing about 1½ cables off it. In vessels of moderate draught the lead will give

General charts 942b, 2759a.

warning of the approach to the edge of the bank opposite these two points.

From Tanjong Wariwi steer straight for the entrance of Etna bay, keeping on the west side along Tanjong Itewi, and when the point 4 miles eastward on the north shore appears open of Tanjong Bawia, round gradually to the eastward. When about 1½ miles eastward of Tanjong Bawia keep on the south side of the channel to avoid the shoal to the westward of the point above mentioned. Give this point a berth if the tidal stream is strong, on account of the eddies, and keep along its eastern side until the part of the bay eastward of Tanjong Jaramabonga comes open, when cross over and keep along the north side of that point and on the south side of the channel, passing southward of the reef in mid-stream; the channel northward of the reef is also clear. Having passed the reef, keep over on the north side as far as a point 2½ miles eastward of the reef, when a west-south-westerly course leads farther inward, but the channel becomes very narrow, and is steepest on the north side.

If using the eastern channel from Tanjong Etaburi, Tanjong Tarella bearing N. 65° E. leads over the bar; when the water deepens to 6 fathoms, alter course to N. 37° E. until Tanjong Wariwi bears N. 78° W., when the entrance to Etna bay may be steered for.

Weather.—Between November, 1904, and February, 1905, rainstorms occurred almost daily in Etna bay, either off the mountains or from the westward. The weather was usually fine in the forenoon, but after midday it was rainy, with sometimes heavy squalls from the mountains. More rain fell in the narrow than in the wider parts of the bay. When the north-west monsoon set in, in the second half of December, there was much swell from the south-west outside the bay, which was felt as far as the entrance at Tanjong Itewi.

Tides.—The tide in Etna bay (*Lat. 3° 54′ S., Long. 134° 40′ E.*) has a double-daily character. The double-daily tide has springs 2 days after full and change, with high water at 5h. and a range of 7 feet; neaps at the same interval after the quarters, with a range of nearly 2 feet.

The single-daily tide has high water on 1st January at 10h. 30m. p.m.; 1st April at 4h. 30m. p.m.; 1st July at 10h. 30m. a.m.; and 1st October at 4h. 30m. a.m., and springs on the day of the moon's half-monthly greatest declination, with a range of 2 feet; with neaps that occur on the day of 0° moon's declination the range is imperceptible.

If the date of the moon's half-monthly greatest declination falls 2 days after full and change, then a greatest range of 11 feet may be expected. Single and double-daily tides cannot, however, fall together.

General charts 942b, 2759a.

Plan of Kaju Mera and Lakahia bays on 1416. Var. 3° 10′ E.

Since the character of the tide is purely double-daily, the time of high water is regulated according to the time of the moon's transit, and it may be accepted that the time of high water occurs about 4 hours after the moon's transit.

At the head of the bay the water falls for about 5 and rises for about 7 hours. Farther down the bay this difference is less, and the hour of high water is also earlier.

Off Tanjong Wariwi the time of high water falls fully one hour sooner than in the bay.

Tidal streams.—The tidal streams in Etna bay turn four times in the day; the strength depends on the range, the phase of the tide, and the breadth and depth of the part of the bay. Generally, the stream at springs has a velocity of from 3 to 4 knots an hour in the narrow parts. The streams follow the direction of the channel, and where the turns are sharp, and at the drying reef in the narrow part of the bay, whirlpools are formed, necessitating careful steerage; in the bight northward of Tanjong Itewi, especially, the water has a continuous turning motion.

Chart 942b, Eastern archipelago, eastern portion.

Coast.—From Tanjong Bohia the coast trends east-south-eastward for about 13 miles to Tanjong Nariki, which is a spur of Mount Buru, and may be recognised by some large yellow patches against the rocks. Five streams discharge on this part of the coast; one of them, named Omba, is approached by a channel with a depth of 4 feet at low water (1910), on the east side of two sandbanks in the entrance; these banks dry at low water, and the outer one has some low bushes on its north side. A course N. 26° E. leads through the channel, with the east entrance point a little on the port bow, and when past the bar keep along the left bank. The western channel has one foot in it at low water, and at high water often has breakers in it. The depths are liable to change; the banks are low and wooded in parts. The mouth of a stream situated 2½ miles north-westward of Tanjong Nariki may be known by a row of bare trunks of trees; from the eastern entrance point of this stream a sandbank projects.

Mount Buru (*Lat. 4° 10′ S., Long. 134° 50′ E.*).—Eastward of Tanjong Nariki the land rises for about 6 miles to a ridge 5 miles long named Mount Buru, which has a greatest height of 4,564 feet, and descends steeply on the east side. Between it and the Charles Louis mountains to the eastward there is a valley with hilly ground.

Between Tanjong Nariki and Vlakke point, about 29 miles east-south-eastward, several rivers discharge. Buru river, the north-western of these, is 10 miles south-east of Tanjong Nariki, and the

Chart 942b, Eastern archipelago, eastern portion. Var. 3° 20′ E.

coast at 3 miles north-westward of the river mouth is high and rocky. The sea was seen breaking 1½ miles west-south-westward, and at 3 miles south-south-eastward of the entrance the depth is 8 fathoms. Between a position 1½ miles southward of Tanjong Nariki and that position depths of from 20 to 25 fathoms were found, decreasing as the river entrance was approached.

Patawai river, about 9 miles south-eastward of the Buru, has a village on the eastern entrance point; the natives are timid and speak Ceramese; they know very little Malay.

Katia river, between the Patawai and Vlakke point, has a large village on the east side of the entrance.

Vlakke point or Tanjong Namarippa (*Lat. 4° 27′ S., Long. 135° 10′ E.*), is a steep foreland which makes as an island from the eastward, and is visible at a distance of 30 miles.

Mountains.—From a few miles eastward of Mount Buru the Charles Louis mountains, from 5,213 to 8,856 feet in height, extend in an easterly direction, and join the Snow mountains, a lofty chain, the highest summit of which has an elevation of about 17,700 feet; the Snow mountains possibly are connected with the Victor Emanuel range to the eastward. The highest summits are covered with snow, and the range is visible from the southward at a distance of 75 miles in clear weather, but it is generally enveloped in clouds, except in the early morning or about sunset. The chain appears gently undulating generally; below the high summits there are a number of broad table-shaped tops.

Coast.—From Vlakke point the coast trends E. by S. ¼ S. with a slight bend northwards for about 100 miles to Cape Steenboom or Tanjong Naurio, and is low and densely wooded, presenting from the sea a monotonously uniform appearance, relieved only here and there by gaps indicating the mouths of rivers. Along this coast there are no off-lying dangers except near Cape Steenboom.

Dudslagers (Umar) river (view *a*, at page 310) discharges 8 miles eastward of Vlakke point, and about 22 miles farther is a wooded point, conspicuous both from westward and eastward. Between Umar river and this point only one river entrance was seen. Near the wooded point three rivulets discharge, the eastern and western of which have villages near them. Coming from the westward the first cocoanut trees were observed by the eastern rivulet.

A remarkable flat summit lies about 9 miles north-westward from the wooded point and 5 miles from the coast, it is a good mark between the bearings of N.E. and N.W. At about 1½ miles southward of the wooded point the depth is 6 fathoms.

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° 30′ E.

Uta river (*Lat. 4° 33′ S., Long. 135° 59′ E.*) discharges about 45 miles eastward of Vlakke point; the entrance is about one mile wide, but it is quite closed by a bank which extends more than a mile seaward. A large village is situated on the west entrance point. Between the wooded point before mentioned and Uta river, three streams discharge; the centre one has a high clump of trees on the west entrance point.

Bakamau river entrance lies about 10 miles eastward of the Uta, and may be readily recognised. The western entrance point projects sharply off and the eastern point appears as two islets; from the latter point a drying bank extends 2 miles in a south-west direction, and breakers were seen at 2½ miles from the shore. A small bank that dries lies in the river entrance, the channel for boats being between it and the west bank. The depth at low water was found to be 2 feet in October and November, 1904; since the greatest range of tide is 7 feet and sometimes only 2 feet, the river is not navigable. Within the small bank the depth was 2 fathoms.

Anchorage.—Between Uta and Bakamau rivers there is anchorage anywhere in from 5 to 8 fathoms; breakers were seen in front of two river entrances on this part of the coast. Southward of the Bakamau the depths decrease rapidly towards the shore.

Coast.—At about 20 miles eastward of the Bakamau the Kaukenau and Migawia rivers discharge by a common mouth, in which is an islet with some high trees on it. On the bar the depth is from 2 to 3 feet at low water. On the Kaukenau is the village of that name; in 1903 the natives were friendly. Between the Bakamau and this river seven other rivers flow into the sea; at high water they may probably be entered by boats, but the Wamur, which has three mouths, was quite closed by breakers as seen from seaward.

Mimika river (*Lat. 4° 38′ S., Long. 136° 31′ E.*) discharges about 22 miles eastward of the Bakamau; it can only be approached at high water by very small steam vessels. A narrow channel winding between large sandbanks leads to the entrance, which is between 80 and 90 yards wide. The channel shifts, and the depth appears to vary; in 1905, only 2 feet were found. Caution is necessary when approaching the river, as the depth decreases rapidly.

The coast is low, swampy, and covered with mangroves. The banks at the entrance are bordered by a strip of sand partly covered with trees and with some primitive dwellings. A few miles up the river is a large village. The natives are friendly; the language spoken is quite different from that of the natives of the Utumbuwe basin, about 110 miles to the south-eastward, and is unintelligible to the people of

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° 10′ E.

Fak Fak and Etna bay. A few miles up the river the water was fresh with a flood tide. A conspicuous, isolated, round wood, near Kaukenau village, serves to indicate the entrance to the river.

There is good anchorage in 6 fathoms, with the west entrance point of Mimika river bearing N. 11° E.

Keuka river, about 2½ miles eastward of the Mimika, has from 2 to 3 feet at low water in the channel leading to it; in the river depths of 6 and 7 fathoms were found. A few miles up the river gardens were found with bananas, cocoanuts, and sugar cane.

Nimei river, 3½ miles eastward of the Keuka, has two villages at its mouth, and from 2 to 3 feet of water in the approach to it.

Atuka river, 2½ miles eastward of the Nimei, has an island in the entrance; in 1904, the western entrance point was marked by a white dead tree trunk, visible from a considerable distance.

The Wania river, 5 miles farther eastward, has two entrances, the western of which is closed by a large bank. The island in the entrance is covered with high trees, and the approach to Murauka village at the east entrance is difficult on account of the breakers. Shoal water extends 2½ miles off the entrance.

Aika river discharges at about 5 miles north-westward of Cape Steenboom, through a wide mouth.

The depths off this part of the coast decrease gradually from 30 fathoms at 10 miles to 5 fathoms at about 1½ miles from the shore. Vessels should not anchor in less than 7 or 8 fathoms if there is any sea or swell.

The flood stream sets east-south-eastward and the ebb west-north-westward along the coast; they are, however, irregular, and are influenced by the current out of the rivers.

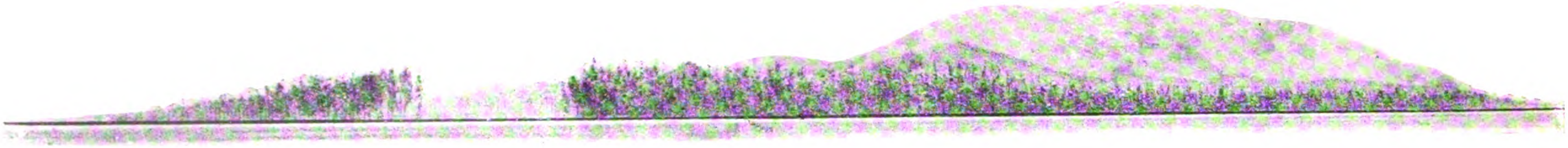
Cape Steenboom or Tanjong Naurio (*Lat. 4° 56′ S., Long. 136° 50′ E.*) consists of two islets connected with the shore by banks, and conspicuous from the high trees growing on them. A dry sandbank extends one mile seaward from the western islet, and forms the eastern side of the channel to the Wajeteri river, which discharges just westward of the point, and has from 2 to 3 feet in the channel. Views *b*, *c*, at page 310.

Shoal water extends south-westward and southward from Cape Steenboom, there being 4 fathoms at 5 miles from the cape in the former direction. Breakers were seen at about 1¼ miles northward of the 4 fathoms. The edge of the bank passes 4 miles southward of the cape, and trends in a south-easterly direction at a distance of from 5 to 12 miles from the New Guinea shore. The edge of the bank off the cape is steep-to, there being 10 fathoms close outside it.

General chart 2759a.

To face page 310.]

(a)



N. 42° W., 3½ m.

Entrance to Dudslagers (Umar) river, S.W. coast of New Guinea.

(b)

Cape Steenboom or Tanjong Naurio.

S.W. coast of New Guinea in the vicinity of Cape Steenboom or Tanjong Naurio (2 views).

(d)

Cape Valsche, N. 58° W.

Cape Valsche (False cape), W. extreme of Frederick Henry island.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° 40′ E.

Coast.—The coast eastward of Cape Steenboom forms a bay formerly called Pisang bay, into which Néwérip river discharges. The approach to the river is barred by Puriri islet, and the banks lying east and west of it. A channel with 3 feet of water was found close along Cape Steenboom, and northward of the islet the depths were 2 and 3 fathoms, but there was no passage eastward of Puriri on account of the numerous drying sandbanks. Puriri has a basin in the middle with an entrance on the west side.

Kupera Pukwa river, with an entrance 3 miles wide, discharges about 10 miles eastward of Cape Steenboom. An extensive bank, dry at low water, lies in a north-east and south-west direction, south-westward of the east entrance point; the western side of the bank has depths of 2 fathoms along it. The eastern entrance point has a pointed tree on it. No passage into the river for vessels was found. Heavy breakers extend along the coast between this river and the Néwérip.

Inabuka river (*Lat. 4° 59′ S., Long. 137° 7′ E.*), about 17 miles eastward of Cape Steenboom, has a least depth of 11 feet on the bar. The following directions relate to the conditions prevailing in 1904, but before using the channel it should be examined, as changes may have taken place.

From a position, in 4 fathoms of water, with the east point of the Kupera Pukwa bearing N. 3° W. and the west entrance point of the Inabuka N. 35° E., a course N. 30° E. leads over the bar, which is one mile across with less than 3 fathoms of water. When the above-named points bear N. 20° W. and N. 40° E., respectively, alter course to N. 57° E., which leads through the middle of the channel, with depths always increasing to 5 fathoms at low water. When the above points bear N. 51° W. and N. 6° E., respectively, steer N. 27° E. up the middle of the entrance in depths of more than 5 fathoms. The channel lies between two banks, dry at low water, which run steeply up to 3 fathoms. A village lies on the right bank.

The tide was observed to range from 2 to 3 feet, and the greatest rate of the tidal stream was 1½ knots an hour.

Utakwa river discharges about 5 miles eastward of the Inabuka. The south-east side of the approach is bounded by banks, dry at low water. Off the entrance a shoal bank extends 6 miles south-westward, with 6 fathoms close outside it. The bar consists of hard sand, and has a least depth of 8 feet on it, but the chart shows a depth of one fathom off the entrance. A conspicuous tree, visible from a considerable distance, stands on the west side of the entrance, where also the mangroves are light green in colour. The east entrance point has a wood of high trees on it, and appeared steep on all sides.

General chart 2759a.

To enter, steer for the eastern entrance point on a N. 53° E. bearing; two tree tops on the coast behind are then just open of the point. The bottom slopes steeply between the depths of 4 and 2 fathoms, and then gradually to the least depth, 8 feet. With the above bearing on, when the two entrance points of the Inabuka river are in line, N. 3° E., the depth is 8 feet more than on the bank. When entering, and past the bar, pass close to the west point, as a bank with 9 feet least water extends nearly across the river from the east point, then steer for the first inner point, and when the water deepens keep in mid-stream. The water of the river was salt at low water. The river was ascended for some distance, and appeared to be of no importance for navigation; the banks are swampy. The tide at the entrance is mixed, mostly single-daily; the range is from 2 to 12 feet. The flood sets W.N.W., and the ebb E.N.E.

Torpedo boat island, off the entrance of a river of the same name, lies 16 miles east-south-east of Utakwa river. It is low, and appears like a torpedo boat with two funnels. On the west point of Torpedo boat river is a conspicuous pointed tree which shows above the island, and is a good mark.

De Jong's banks are two shoals of hard sand lying about 9½ miles south-west of Torpedo boat island and within the 5-fathoms line; the lead gives no warning of approach to them. The depth on the banks is not stated, but there are 13 feet at the edge of one of them. In bad weather they are marked by heavy breakers.

Kasteel island (*Lat. 5° 11′ S., Long. 137° 38′ E.*), about 10 miles east-south-eastward of Torpedo boat island, lies near the shore abreast the entrance to the Kasteel river; it is lower in the centre than at the ends, and has the appearance of a castle with battlements. The island is surrounded by a dry bank which extends from 2 to 3 miles westward. The passage between the island and the shore is not deep enough for a steamboat even at high water. Between Kasteel island and the Utumbuwe river to the eastward the coast is low and monotonous: two conspicuous trees serve as marks.

Kasteel river discharges abreast Kasteel island. On the west entrance point are three conspicuous trees. A good channel leads directly to the river entrance, which is 1½ cables wide, passing eastward of Kasteel island, but no depths are given. About 2 miles up, the river divides into two broad arms of about equal width; the northern of these soon subdivides into a number of branches, one of which connects with a branch of the Torpedo boat river; the banks are low, swampy, and covered with mangroves and nipa palms.

The north-eastern arm has higher banks and luxuriant vegetation; in 1907 it was ascended by the Netherlands Government steam vessel

Spits (draught not known) for some hours, when it divided into two branches, the northern of which was ascended by steamboats for four hours, when the depth was 27 feet.

Blumen river discharges about 7 miles south-eastward of the Kasteel. Its lower course appeared to form a large delta in connection with the Kasteel. The whole produces the impression of an extensive lagoon with numerous wide and deep channels, the mudbanks of which are thickly covered with mangroves and nipa palms. A branch leading north-westward was followed in 1908 by the Netherlands Government steam vessel *Valk*, of 12 feet draught, and on further examination by boat appeared to connect with the Kasteel. A north-eastern branch was followed for 1½ days by steamboats as far as lat. 4° 53′ S., and might have been followed farther.

Laag island (*Lat. 5° 18′ S., Long. 137° 41′ E.*), lying 5 miles south-westward of the entrance to the Blumen river, is about half a mile long north and south and a quarter of a mile broad; it is low and covered with vegetation. At 7 miles west-south-west from the island the depth is 6 fathoms, with shoaler water between. A small islet lies about 4 miles E. by N. ¼ N. from Laag island, and about one mile from the coast.

Hellwig river.—The entrance to this river lies eastward of Laag island, and is nearly half a mile wide. A conspicuous tree stands on the west side of the entrance. The river is approached by a channel with a depth of 18 feet, and is navigable by a small steam vessel for a distance of 30 miles, where the width is about 80 yards; it there divides into two branches, one trending north-west and the other north-north-east, which were ascended for some miles by a steam launch. The river basin is well populated. At the entrances of the side branches four very large villages were found, the inhabitants of which were friendly. The mudbanks along the river to where it divides are covered with nipa forest, but farther up the banks are tolerably high and covered with rattan canes.

Chart 2759a, Australia, northern portion.

UTUMBUWE RIVERS include the North-west and North rivers, and the Utumbuwe proper, which is the southernmost of the three; the North-west and North rivers discharge through a common mouth into Flamingo bay, at about 21 miles east-south-east of Laag island, and the Utumbuwe a little more to the southward.

North-west river is about two-thirds of a mile wide at the entrance, but higher up it soon narrows to about 80 yards. For a vessel of 12 feet draught and 162 feet long the river, in 1908, appeared to be navigable with rising water for a distance covered by 8 hours steaming.

In the upper part of the river it divides in three places into two arms, which join again higher up. When the river is at its normal height, the most favourable time being the so-called little rainy season, from the middle of October to the middle of April, a steamboat can reach the third point of division in fully two days, and from there the mountains can be reached in three days by canoe. When the water was low a steamboat could only reach the first point of division of the river. At the farthest point reached, the river flows between very steep rocky walls from 165 to 195 feet in height; its width was less than 30 feet, and the depth from 4 to 5 feet.

The North-west river is connected with the Hellwig by a navigable branch. There are several villages on the river; the natives are friendly.

North river (*Lat. 5° 24′ S., Long. 138° 4′ E.*) is navigable by steam vessels of 162 feet in length and 12 feet draught as far as just below the Dumas river, a tributary which joins the main stream in about lat. 5° S. A steamboat can proceed as far as 4° 47′ S., and a canoe as far as 4° 40′ S. From this point the Lorentz expedition, in 1909, reached Wilhelmina Top (15,750 feet), 24 miles to the northward, after a journey of 25 days. A branch, serviceable for steamboats, connects the lower part of the North river with the Utumbuwe. The banks of the lower river are low and muddy, becoming higher farther up; they are densely wooded, mostly with mangroves in the lower part, which give place gradually to heavy timber. There are many sago but no cocoanut trees. A great number of villages were observed on the river, generally at the entrances of side branches; the natives are friendly.

Utumbuwe river was ascended in 1906 by the Netherlands Government ship *Valk*, a vessel of the dimensions given above under North river, for 50 miles, and by a steamboat for 23 miles farther. Between the entrances of the North and Utumbuwe rivers a shoal extends 3 miles south-westward.

Directions.—To enter the North and North-west rivers, bring the north entrance point of the Utumbuwe river to bear N. 82° E., and steer for it; the first inner point of the river will be seen just open to the southward. On this course a bar is crossed on which the least depth is apparently 12 feet; northward of this channel is a bank dry at low water, and when it is in line with a conspicuous grove of trees on the west side of the entrance to the North-west river, the shoalest water has been passed. When the entrance to the two northern rivers

Chart 2759a, Australia, northern portion. Var. 3° 50′ E.

comes open steer N. by E. ¼ E. for the west entrance point of the North river, in depths of from 4 to 5 fathoms, and when within the common entrance to the two rivers keep towards the east bank if entering the North river.

To enter the Utumbuwe, continue the course N. 82° E. as above described until the drying bank northward of the channel is in line with a conspicuous tree on the west entrance point of Hellwig river N. 48° W., when steer S. 48° E. with that mark astern straight for another conspicuous tree on the south bank of the Utumbuwe. As soon as the inner point on the north side, where the river turns northward, bears N. 73° E., steer for it and enter the river.

The entrances to these rivers may also be approached by a channel with 18 feet least water, which was found leading in a north-east and south-west direction over Providential bank.

Chart 942b, Eastern archipelago, eastern portion.

Providential bank (*Lat. 5° 34′ S., Long. 137° 52′ E.*) lies westward of Utumbuwe river, and extends 13 miles from the shore with a depth of 2¼ fathoms. The grove of trees on the west side of North-west river entrance, bearing N. 59° E., leads northward of the bank. The grove is visible 20 miles off, and is soon recognised by its peculiar form, which is rounded, with a notch in the middle in which the tops of some trees are seen.

Chart 2759a, Australia, northern portion.

Eilanden or Lorentz river discharges by two arms about 8 miles apart, the northern of which is about 12 miles southward of Utumbuwe river. This river was ascended by the Netherlands Government steam vessel *Valk*, drawing 12 feet, in 1909, entering at high water by the northern arm, but in which there is no longer sufficient water; it trends in a general E. by N. direction; its width is very irregular, and in it are several islands which were left to the northward. The banks of the river are very monotonous, bamboo was seen occasionally, but no cocoanut trees. Some villages were seen in the lower part of the river. In about lat. 5° 21′ S., long. 139° 22′ E. the river is joined by a stream from the north; above this point the banks which had hitherto been low became higher, and there were very sharp turns. The current had a velocity of 2½ knots an hour. A few miles eastward the river divides into two branches, northward and eastward; the eastern was entered for a short distance, where the depth was 19 feet, but the turns were too sharp to allow of proceeding farther.

On leaving the river the southern arm was taken, where the depths are from 3 to 5 fathoms, with from 2½ to 3 fathoms outside the entrance.

General charts 2759a, 780.

Chart 2759a, Australia, northern portion. Var. 4° E.

From 6 to 7 miles westward of the south entrance point is a sandbank which apparently extends to Triton bank. When approaching the southern arm, the south entrance point, marked by a clump of trees higher than the others, should be steered for on an East bearing, which leads in 2½ fathoms least water northward of the sandbank. The south point of the northern entrance stands out conspicuously, and is a good mark. Three days after new moon a single-daily tide was found here, with a range of 15 feet. The flood sets northward and the ebb southward.

Triton bank (*Lat. 5° 58′ S., Long. 138° 3′ E.*), consisting of hard sand with a least depth of 3 feet on it, lies 12 miles south-westward of the south entrance point of the southern arm of Eilanden river; the edge of the bank extends 2 miles farther seaward. A ridge of mud connects it with the shore.

Coast.—From Utumbuwe river the coast trends south-south-eastward for about 30 miles, and then south-eastward; it is low, wooded, and of mud formation. Some villages were seen, but from the hostile bearing of the natives it was not considered advisable to land.

Odammun river, about 60 miles southward of Eilanden river, discharges by three mouths, named, from the northward, Mabur, Maju, and Viarre.

The southern entrance, the Viarre, is accessible by vessels of 12 feet draught; the least depth at low water is 1¾ fathoms.

Shoal.—A bank with 1½ fathoms on it is situated outside the southern entrance, 8 miles N. 19° W. from De Jong's point, on the south side.

There is no difficulty in entering; vessels should steer for the north point of the channel, avoiding the shoal above mentioned.

The depth in the approach to the two northern channels is 2 fathoms, but at the inner end of the centre one a depth of one fathom is charted.

At about 40 miles above De Jong's point the Odammun divides into two branches, the Kawarga, which connects with the Digul river, and the Mapi. The lower part of the latter river trends in an east-north-east, and the upper part in a northerly, direction. In the lower part the Mapi is from 100 to 160 yards wide, and after a bar of 12 feet was passed the depths increased gradually to about 7 fathoms. The *Valk*, drawing 12 feet, steamed up the river as far as lat. 6° 16′ S., where the width was about 65 yards, and the depth from 8 to 12 fathoms; small craft can go much farther. There is very little current in the river. Large and small villages along the river point to the presence of a numerous population. In some places friendly relations were established with the natives.

General chart 780.

Chart 2759a, Australia, northern portion. Var. 4° E.

Digul river (*Lat. 7° 10′ S., Long. 138° 45′ E.*) is the most considerable river on the west coast of New Guinea, and takes its rise probably in the mountains near Juliana Top.

The river is about 6 miles wide abreast Modder point, on the south side of the entrance but narrows gradually eastwards. Several banks and dangers, dry at low water, lie on the north side of the channel, and a shoal with one fathom on it lies about 3 miles west-north-westward of Modder point. Along Modder point, where the bank is not joined to the south shore, there is a channel 1⅜ miles wide with a least depth of 12 feet. One day before the moon's quarter a stream of 4½ knots an hour was found when at anchor. The chart shows depths of one and 1½ fathoms in the channel, about 12 miles within Modder point. The country on either side of the lower Digul is low and swampy; higher up the character of the land slowly changes and becomes hilly with elevations of little height, which, on the east side, near the Uwimmerah, are elevated between 30 and 35 feet above the surrounding country; on the west side the land is lower.

The Digul is navigable by vessels of 162 feet in length and 12 feet draught to above the Koniege, a tributary on the right bank, or to lat. 6° 5′ S., long 140° 18′ E. Above this point, known by a steep wall of red and white clay about 25 feet high, a ridge of rock with 12 feet on it extends across the river.

In 1909 the river was ascended to a distance of 360 miles from its mouth, or to lat. 5° 20′ S., long 140° 27′ E. The last 30 miles was covered by canoe, the remainder of the examination was made in a river steamer of 6 feet draught. In lat. 5° 45′ S., long 140° 14′ E. the river was more than 100 yards wide, with a depth of 5 fathoms, but at the farthest point reached by the steamer the depth was from 10 to 12 feet, and the width about 1½ cables; above this a steamboat could not go, owing to the shoals. On the upper part of the Digul, which, above the tributary Uwimmerah, is named Uwamba Uru, the natives were hostile, the boats and bivouacs being repeatedly shot at. On the lower river the natives are friendly; they have no permanent villages, but move about continually.

The **Kawarga**, connecting the lower Digul with the Odammun river, has depths of 3 and 4 fathoms; high water should be waited for to pass through it.

The principal tributary of the Digul is the Uwimmerah, which joins it by the left bank in lat. 6° 32′ S., long. 140° 20′ E. Its width decreases from over 100 yards at the junction to 70 yards at a day's steaming above the entrance to the Inggivake, the depth then being from 4 to 5 fathoms. The Uwimmerah was ascended as far as lat. 5° 29′ S., the last 40 miles by canoe, as it then had the character

General chart 780.

Chart 2759a, Australia, northern portion. Var. 4° E.

of a mountain stream. The river has innumerable windings; in the lower part the banks are wooded, and high and low alternately; higher up they become gradually hilly, and sometimes steep. The natives were friendly.

The Inggivake was also ascended for some distance; it has depths of 5 fathoms at the entrance, and 4 fathoms at a distance of two days' steam upwards, but is very narrow; snags prevented further examination. The natives were hostile, and twice shot arrows at the boats.

The Ederah flows southward, and joins the right bank of the Digul in lat. 7° 8′ S., long. 139° 50′ E.; it is from 55 to 65 yards wide at the entrance, with depths of from 5 to 6 fathoms; at 40 miles up it was 25 yards wide, and from the appearance of the water it appeared to rise in a swamp.

Directions.—When approaching Digul river (*Lat. 7° 10′ S., Long. 138° 45′ E.*) from the southward a wide berth should be given to Modder point, keeping De Jong's point bearing North; an E. ½ S. course shaped to pass 1½ miles northward of Modder point leads in in depths of from 2 to 3 fathoms, but farther in there is less water, as previously mentioned. One of the rocks on the north side of the channel is strongly magnetic. Coming from the northward, shoal water extends about 5 miles westward of De Jong's point. Vessels should enter the river on a rising tide.

Tide.—At one day before full moon a range of tide of 15 feet was observed in the river.

Chart 942b, Eastern archipelago, eastern portion.

Kolff bank (*Lat. 7° 0′ S., Long. 136° 50′ E.*).—The *Dourga,* in 1826, passed over a bank of hard sand, about 6 miles in diameter, with 8 and 9 fathoms over it, the depth around being 19 or 20 fathoms, mud.

Chart 2759a, Australia, northern portion.

Frederick Henry island, the south-westernmost part of New Guinea, is separated from the mainland by Princess Marianne, or Dourga strait. The island is about 100 miles long north-east and south-west, and 50 miles wide at the eastern part, but tapers to a narrow point at Cape Valsche, its western extremity. The land is everywhere low, apparently marshy, and covered with a dense forest. The north-west coast is fronted by a mudbank extending about 7 to 12 miles from the shore, with 3 fathoms on its outer edge, from which the depth increases very gradually seaward. About 50 miles north-east from Cape Valsche the shoal facing the north-western side of the island decreases in breadth, allowing of a nearer approach to the

General chart 780.

Chart 2759a, Australia, northern portion. Var. 4° E.

shore. Southward of Cape Valsche the 3-fathoms edge of the bank is about 4½ miles from the shore, and is much steeper than on the north-west side of the island.

Charts 2759a, 447.

Princess Marianne (Dourga) strait.—The northern entrance of Princess Marianne or Dourga strait, named Muli by the natives, is 10 miles wide, with a depth of from 6 to 9 fathoms; the width as well as the depth gradually decreases, and the strait becomes narrow at the southern part, where it is very shoal, and liable to constant change; the southern entrance should only be attempted with rising water. The strait affords a safe passage for large sailing praus, which thereby avoid the heavy swell off Cape Valsche. The bottom varies between sand, mud, and clay; the banks are low and little above high water, and the land is flat and wooded. Here and there the immense grass plain of the interior approaches the bank. Numerous creeks discharge on both sides of the strait, affording fresh water in the rainy season at a short distance up stream.

The Dajawal and Madib rivers discharge on the eastern side of the northern part of the strait. The Dajawal is about a quarter of a mile wide at the entrance, with a depth of 5 fathoms; at 6 miles up it is 160 yards wide and 2 fathoms deep, and at 12 miles only 20 yards wide, with a depth of 3 feet.

Approaching Princess Marianne strait from the northward, De Jong's point should be kept bearing North until Modder point is about E. ½ N., when steer for the entrance, keeping from 1½ to 2 miles from the mainland shore, as a mudbank with one fathom over it lies about 4 miles S. by E. from the point between Digul river and the strait.

Tides.—It is high water, full and change, in Princess Marianne strait at 11h. 30m.; the mean range at the northern entrance is 30, and at the southern entrance 20 feet. In the northern entrance a predominating single-daily tide was observed, and a predominating double-daily tide in the southern entrance. The tidal streams in the strait are very strong; off Bumbel island, in the southern part of the strait, a stream was observed to have a velocity of from 5½ to 6 knots an hour. There appears to be no connection between the current and the vertical movement of the water in the southern entrance.

During the passage through the strait, 26th April to 9th May, 1835, two flood streams and two ebb streams in 24 hours were observed at the entrance, but within the strait there was but one flood and one ebb stream. The former set to the south, and the latter to the north.

General charts 2759a, 780.

Chart 447, W. approaches to Torres strait. Var. 3° 30′ E.

Cape Valsche or False cape (*Lat. 8°21′S., Long. 137°41′E.*), the western extreme of Frederick Henry island, is reported to lie about 4 miles south-westward of the position given. The 3-fathoms edge of the shore bank extends 12 miles W. by S. from the cape; a depth of 4 fathoms lies 18 miles west-south-west from the cape, and a depth of 6 fathoms at 25 miles in the same direction. An area of discoloured water lies about 22 miles west-south-west from the cape. The cape should be given a good berth; there is generally a heavy sea off it in the south-east, and often in the north-west, monsoon. The mudbank which faces the coast here extends 10 miles to the westward, and for 15 miles in a S.W. by W. direction; at the distance of 5 miles further westward the depth is 5 fathoms, and much discoloured water has been observed. View *d*, at page 310.

Chart 942b, Eastern archipelago, eastern portion.

The ARAFURA or TIMOR SEA, that part of the Indian ocean extending from Torres strait to the island of Timor, is bounded to the southward by the northern coast of Australia, and to the northward by part of the south-west coast of New Guinea and the chain of islands lying between it and Timor.

This sea being little known beyond the routes generally taken by vessels from Torres strait towards Timor, and between Torres strait and Port Darwin, it is probable that shoals exist in addition to those marked on the Admiralty charts. As the positions and even the existence of some of these are doubtful, a vigilant look-out should be kept, with the view of removing these doubts, as well as for the safety of the vessel.

Soundings.—The greater part of this sea has a depth of less than 100 fathoms. In proceeding westward from Torres strait the soundings increase regularly from 9 fathoms near Booby island, to about 30 fathoms between Cape Valsche in New Guinea, and Cape Wessel in Australia; thence the soundings increase in depth more rapidly to 100 fathoms when about midway between the Aru islands and Cape Croker, and to 642 fathoms 23 miles southward of Selaru island. A less depth of water, however, continues along the north and north-west coasts of Australia, and the 100-fathoms contour-line can be traced from the above position midway between the Aru islands and Cape Croker, westward as far as the Sahul bank, 50 miles south of Timor, and then south-west gradually approaching the Australian coast.

The depths over the northern part of this Australian bank are mostly between 40 and 60 fathoms, and to the eastward of the meridian of Dundas strait, are fairly regular; to the westward of that line they are irregular, from 20 to 70 fathoms with patches of less than 20 fathoms, and are especially irregular near the edge of the bank,

General chart 2759a.

Chart 942b, Eastern archipelago, eastern portion. Var. 3° E.

where various shoals have been found. Other shoals probably exist, and a good look-out should therefore be kept in navigating these waters.

Chart 942a, Eastern archipelago, eastern portion.

DANGERS in the MAIN TRACK OF VESSELS.—The **Sahul bank,** said to extend from the meridian of 126° E. to 124° E., and from the parallel of 10° 43′ S. to 12° S., and to consist of banks of sand and coral rocks with depths ranging from 10 to 16 fathoms, is out of the scope of this work; a description of it will be found in the Australia Directory, Vol. III.

As the Sahul bank has not been surveyed, it should be avoided, or passed with caution.

Troubadour shoal (*Lat. 9° 44′ S., Long. 128° 28′ E.*) has a depth of 9 fathoms, and at about 13 miles south-east from it is a shoal with 12 fathoms, sand and reddish coral.

Chart 1044, North coast of Australia.

Flinders shoal is circular in shape, and 1½ miles in diameter, and has a general depth of 6 to 8 fathoms, coral. The shoalest part, with 5 fathoms over it, is situated in lat. 9° 52′ S., long. 129° 17′ E.

Franklin shoal is circular in shape, and one mile in diameter, with a general depth of 6 to 8 fathoms over coral. The shoalest place, with 5 fathoms on it, is situated in lat. 9° 53′ S., long. 129° 19′ E.

Blackwood shoal is about 6 cables in diameter, with a general depth of 8 to 14 fathoms, coral bottom. The shoalest spot, of 7 fathoms, lies in lat. 9° 53′ S., long. 129° 25′ E.

Evans shoal extends 5¾ miles north-north-west and south-south-east, with a breadth of 3½ miles, and has a general depth of 7 to 11 fathoms. The shoalest part, with 5 fathoms on it, coral bottom, lies 4 cables from the north extreme, in lat. 9° 53′ S., long. 129° 33′ E.

There are quantities of snakes and sea perch on these banks.

Caution.—It is probable that many other shoals exist on or near the same parallel of latitude, both eastward of Evans shoal and westward of Flinders shoal. The four shoals above mentioned are probably part of a submerged barrier lying along the edge of the bank. Northward of them the character of the bottom changes to globigerina ooze.

Lynedoch bank (*Lat. 10° 2′ S., Long. 130° 49′ E.*) was discovered by the ship *Lord Lynedoch* on October 26th, 1838. The bank is about three-quarters of a mile in extent, and has a least depth of 7 fathoms over it.

General charts 942b, 2759a.

Chart 1044, North coast of Australia. Var. 3° E.

Victoria shoal, reported to have only 4½ feet water over it, and to be situated in about lat. 9° 13′ S., long. 131° 24′ E., having been unsuccessfully searched for by H.M.S. *Rambler*, 1887, and again by H.M.S. *Egeria*, 1890, has been expunged from the Admiralty charts; "Site of Victoria shoal unsuccessfully searched for" has been placed near the position.

Current.—During the above search by H.M.S. *Egeria*, the current on the night of 2nd October, 1890, was observed to run to the westward, at the rate of half a knot per hour; and during the day, 3rd October, to the north-westward, at seven-tenths of a knot per hour.

Money shoal (*Lat. 10° 21′ S., Long. 132° 45′ E.*) is of coral formation, very flat, about 4 miles in extent west-north-west and east-south-east, and 1¾ miles in width. It has a general depth of 4½ to 5 fathoms over it, and several patches of 3 fathoms on its eastern edge, the easternmost being about N. by E. 38 miles from Cape Croker. During fresh easterly winds the shoal has been seen to break.

Tidal streams.—At Money shoal the rising stream sets W.N.W. at the rate of a half to one knot an hour, and the falling stream S.E. from a half to three-quarters of a knot; the streams are much influenced by the prevailing easterly winds, which cause, at times, a general set to the westward.

For shoals nearer the coast of Australia, *see* Australia Directory, Vol. III.

Currents.—*See* page 16.

Winds and weather.—*See* page 14.

TIDAL STREAMS.—The set of the tidal streams in the Arafura sea is not well known, but the streams do not appear to be strong, the current generally setting with the wind. The flood stream enters the sea from the eastward through Torres strait, and from the north-west by the Aru islands. Observations are wanting as to the tides between Timor Laut and Timor; but south of Timor the flood stream sets towards the east.

General charts 942b, 2759a.

PLACE—AMBOINA. OBS. △. LAT. 3° 45′ S. LONG. 128° 15′ E.

METEOROLOGICAL TABLE COMPILED FROM 5 YEARS' OBSERVATIONS.

MONTH.	BAROMETER At 32° F. and Mean Sea Level.					AIR TEMPERATURE.							Relative Humidity.	Cloud Amount. Scale 0 to 10.	RAIN.			WIND.										No. of Days Gales.	No. of Days Fogs.
	Mean.		Absolute.			Mean.				Absolute.									Number of Days from										
	For Month.	Daily Range.	Max.	Min.	Range.	For Month.	Max.	Min.	Range.	Max.	Min.	Range.			Total Fall.	No. of Days.	Max. Fall in 24 hours.	Mean Force, Beaufort Scale.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.		
	Ins.	Ins.	Ins.	Ins.	Ins.	°	°	°	°	°	°	°	%		Ins.		Ins.												
January	—	—	—	—	—	81	—	—	—	—	—	—	85	—	5·5	14	—	—	4	5	2	1	1	2	4	6	6	—	—
February	—	—	—	—	—	81	—	—	—	—	—	—	84	—	4·9	14	—	—	5	5	1	1	0	2	7	7	0	—	—
March	—	—	—	—	—	81	—	—	—	—	—	—	85	—	5·1	15	—	—	2	5	1	2	1	3	5	9	3	—	—
April	—	—	—	—	—	80	—	—	—	—	—	—	87	—	11·6	18	—	—	3	3	4	5	2	3	4	2	4	—	—
May	—	—	—	—	—	79	—	—	—	—	—	—	87	—	21·1	22	—	—	1	3	11	7	1	1	2	1	4	—	—
June	—	—	—	—	—	78	—	—	—	—	—	—	91	—	24·9	25	—	—	0	5	8	4	0	4	1	1	7	—	—
July	—	—	—	—	—	77	—	—	—	—	—	—	91	—	24·9	23	—	—	0	5	12	8	1	0	1	1	3	—	—
August	—	—	—	—	—	77	—	—	—	—	—	—	90	—	19·6	22	—	—	1	4	8	14	1	0	0	1	2	—	—
September	—	—	—	—	—	78	—	—	—	—	—	—	87	—	8·2	14	—	—	0	1	6	17	2	1	0	0	3	—	—
October	—	—	—	—	—	79	—	—	—	—	—	—	85	—	7·0	14	—	—	1	0	6	14	2	2	2	0	4	—	—
November	—	—	—	—	—	81	—	—	—	—	—	—	84	—	4·7	11	—	—	0	0	5	10	2	4	2	3	4	—	—
December	—	—	—	—	—	81	—	—	—	—	—	—	83	—	5·0	13	—	—	3	2	2	4	1	6	4	3	6	—	—
Means	—	—	—	—	—	79	—	—	—	—	—	—	87	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	142·5	205	—	—	20	38	66	87	14	28	32	34	46	—	—
Absolute Vals.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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" Rainfall of the East Indian Archipelago."
" Challenger " Report.

W. N. SHAW,
Meteorological Office,
19th March, 1910.

APPENDIX.

MEAN MONTHLY AND ANNUAL RAINFALL IN INCHES AT EIGHT STATIONS.*

Place.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Menado	19·0	14·1	11·3	8·3	6·3	6·6	5·0	4·0	3·3	4·5	8·3	15·2	105·8
Ternate	8·9	7·2	6·7	8·9	8·8	8·2	5·3	4·4	4·0	5·7	7·4	8·5	84·1
Kayeli	9·4	8·2	9·2	6·3	6·0	8·5	6·5	4·4	2·2	2·0	2·5	7·7	73
Wahai	11·7	17·2	12·2	7·9	5·6	4·1	4·3	3·1	3·3	4·1	4·1	8·3	85·9
Amahai	4·5	4·1	5·7	7·9	12·5	15·2	18·5	17·2	9·7	5·9	4·5	4·4	110·2
Saparua	4·0	4·1	5·1	9·8	20·3	25·4	24·4	17·4	10·1	7·7	3·5	5·3	137·1
Banda	10·6	7·8	9·3	13·1	16·9	15·7	8·3	4·3	4·9	4·9	5·1	10·0	111
Tual	13·2	10·9	12·9	10·1	8·6	6·6	5·7	1·5	1·7	2·6	6·7	12·8	93·2

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* Taken from the Zeemansgids voor den Oost-Indischen Archipel, Part IV., 1906, and Part V., 1908.

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Part II.—Eastern shores of the North sea, the White sea, Iceland, and the Færoes	2	0
Part III.—Baltic sea	2	0
Part IV.—Western coasts of Europe and Africa from Dunkerque to the Cape of Good Hope, including Azores, Madeira, Canary, and Cape Verde islands, &c.	1	6
Part V.—Mediterranean, Black, Azov, and Red seas	1	6
Part VI.—South and East Africa, East Indies, China, Japan, Australia, New Zealand, and West Pacific islands	2	0
Part VII.—South America, Western coast of North America, and East Pacific islands	1	0
Part VIII.—Eastern coasts of North America and Central America from Labrador to Cape Orange, including Bermuda and islands of the West Indies	2	6

TIDES.

Tide tables for British and Irish ports, and for other Selected ports: also the local and Greenwich time of high water on full and change days, with the rise of the tide at springs and neaps for the principal ports of the world	1	6
Notes on the Tidal streams at the entrance of the English channel	1	0
Tides and Tidal streams of the British Islands, the North sea, and the North coast of France, 1st edition, 1909	2	6

MISCELLANEOUS.

Catalogue of charts, plans and sailing directions (*corrected annually to 31st December*).		
Consecutive List of Admiralty Charts (*corrected annually to 31st December*)	0	8
Admiralty manual of scientific enquiry, 5th edition, 1886	2	6
List of Time signals established in various parts of the world, 1911	1	0
Distance tables, Mediterranean, Black, and Red seas	1	6
Rules for finding distances and heights at sea, 5th edition, 1866	0	6
Dock book containing dimensions of the wet and dry docks, patent slips, &c., of the world, with information relating to shipbuilding and engineering works, 1905	10	0
Supplement, 1908	1	0
On the Station-pointer, and the manner of fixing a ship's position by its aid, 1903	0	6
Notes bearing on the navigation of H.M. ships, 1909	0	2
Index to Notice to Mariners, 1910	1	0

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Belfast	S. D. Neill	22, Donegal Place.
Blyth	Alder & Co.	Ridley Street.
Bristol	Price & Moore	1 and 2, Broad Quay.
Cardiff	T. J. Williams	63, Bute Street, Docks.
,,	T. L. Ainsley	Primavesi Chambers, James Street.
,,	Wilson & Gillie, Bruce & Son	91, Bute Street.
Cowes (West)	G. H. May & Co.	126 & 127, High Street.
,, ,,	Pascall, Atkey & Son	29, High Street.
Dartmouth	Cranford & Son	Library, Fairfax Place.
Dover	C. Clout	135, Snargate Street.
Dublin	Hodges, Figgis & Co., Ltd.	104, Grafton Street.
Dundee	Colville & Feathers	29, Dock Street.
Falmouth	Williams & Co.	The Quay.
Glasgow	Whyte, Thomson & Co.	144, Broomielaw.
,,	Dobbie, McInnes, Ltd.	57, Bothwell Street.
,,	D. McGregor & Co.	57, Bothwell Street.
,,	Kelvin & James White, Ltd.	16-18, Cambridge Street.
Gosport	Camper & Nicholson's	Yacht Builders.
Greenock	R. Love	17, West Backhall Street.
Grimsby	H. A. Johannesen	Fish Dock Road.
Harwich	John Groom & Sons	Lloyd's Agents.
Hull	Newton Bros. & Holiday	Prince's Dock.
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Liverpool	Philip, Son & Nephew	49 & 51, South Castle Street.
,,	John Parkes & Son	11, St. George's Crescent.
,,	Frodsham & Keen	31, South Castle Street.
,,	John Bruce & Sons	25, South Castle Street.
,,	Dobbie, McInnes, Ltd.	39, South Castle Street.
London	E. Stanford	12-14, Long Acre, W.C.
,,	Imray, Laurie, Norie, & Wilson,	156, Minories, E.C.
,,	H. Hughes & Son	59, Fenchurch Street, E.C.
,,	Sifton, Praed & Co., Ltd.	67, St. James' Street, S.W.
Londonderry	E. A. Minniece	23, Ship Quay Street.
Maryport	Quintin Moore	Harbour House.
Middlesbrough	Constantine, Pickering & Co.	Docks.
,,	J. Durkin	Dock Street.
Milford Haven	W. H. Cowley	27, Hamilton Terrace.
Newcastle-on-Tyne	M. S. Dodds	61, Quayside.
,, ,, ,,	S. A. Cail & Sons	29 & 31, Quayside.
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North Shields	Wilson & Gillie	New Quay.
Oban	Hugh Macdonald	"Times" Office, Esplanade.
Plymouth	J. Blowey	23, Southside Street.
Portsea	Griffin & Co.	2, The Hard.
Portsmouth	C. Groom, Ltd.	50, Broad Street.
Queenstown	T. Miller	1, Harbour Row.

South Shields	T. L. Ainsley	Mill Dam.
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,,	J. G. Fay & Co., Ltd.	80 & 90, High Street.
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,,	T. Reed & Co.	184, High Street West.

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Amsterdam	L. J. Harri	Prins Hendrikhade, No. 90.
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Athens	Const. Eleftheroudakis	Place de la Constitution.
Berlin	D. Reimer	29, Wilhelmstrasse.
Bombay	Lawrence & Mayo	Esplanade.
Bremen	W. Ludolph	6, Tannenstrasse.
Bremerhaven	W. Ludolph	72, Smidtstrasse.
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Hague, The	Van Cleef Brothers	Libraries.
Hamburg	Eckhardt & Messtorff	Steinhoft I.
,,	Thos. Downie	9, Stubbenhuk.
,,	Friederichsen & Co.	22, Monckeberg-strasse.
Havre	L. Croix	15, Rue de Paris.
Hobart (Tasmania)	Walch & Sons	Merchants.
Hong-Kong	C. J. Gaupp & Co.	Alexandra Buildings.
,,	G. Falconer & Co.	Queen's Road, Central.
Lourenço Marques	A. W. Bayley & Co.	Booksellers, &c.
Malta	Collector of Customs	Custom House.
Melbourne	J. Donne & Son	346, Little Collins Street.
Montreal	Harrison & Co.	53, Metcalfe Street.
New York	John Bliss & Co.	128, Front Street.
Newcastle (N.S.W.)	W. H. Sproull & Co.	99, Hunter Street.
Paris	Augustin Challamel	17, Rue Jacob.
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Port Natal	Lewis J. Wilson	The Point.
Port Said	Vella & Portelli	Shipping Agents.
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Rangoon	Lawrence & Mayo	8, Phayre Street.
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,,	Hirsbrunner & Co.	1, Nankin Road.
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Sydney (N.S.W.)	Turner & Henderson	16 & 18, Hunter Street.
Tokyo* (Japan)	Takata & Co.	Merchants.
Toronto (Canada)	Charles Potter	85, Yonge Street.
Trieste	F. H. Schimpff	11, Piazza della Borsa.
Vancouver City (B.C.)	Thomson Stationery Co., Ltd.	325, Hastings Street.
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**Note.*—The Agents in Tokyo for Japanese charts are the Nippon-Yusen Kaisha.

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